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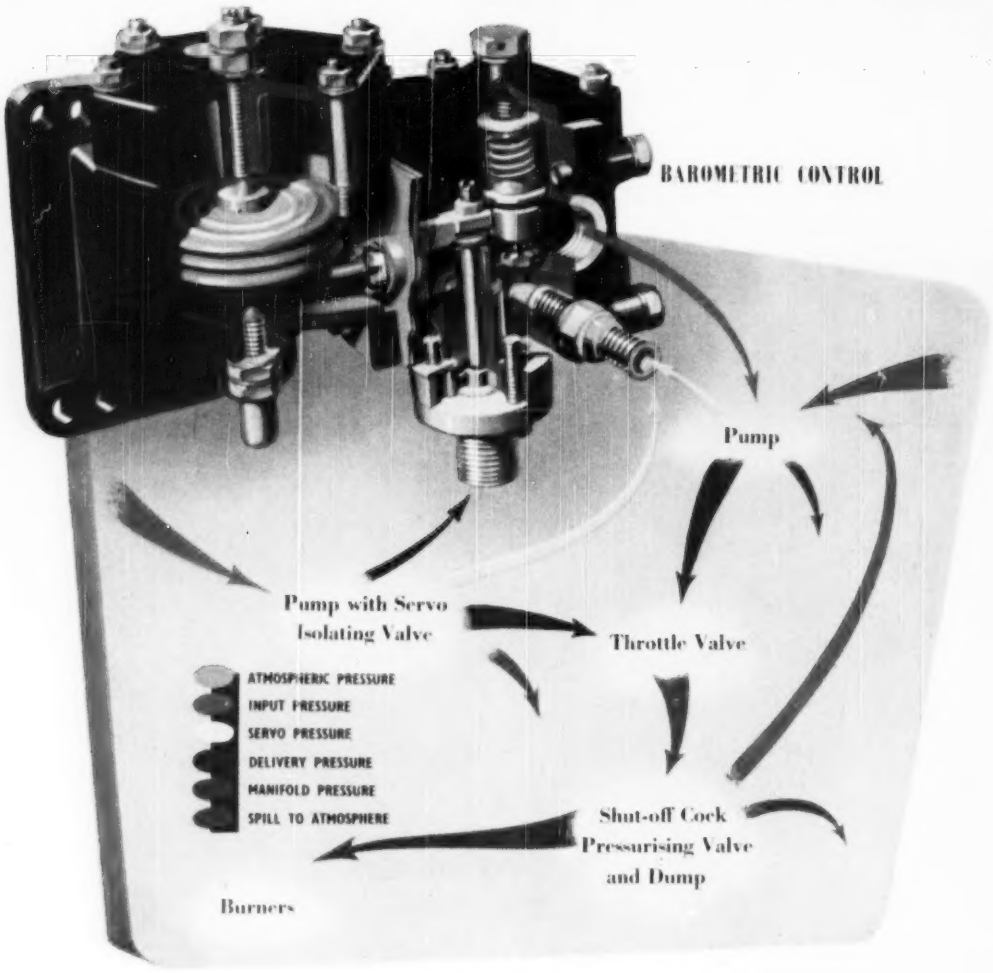

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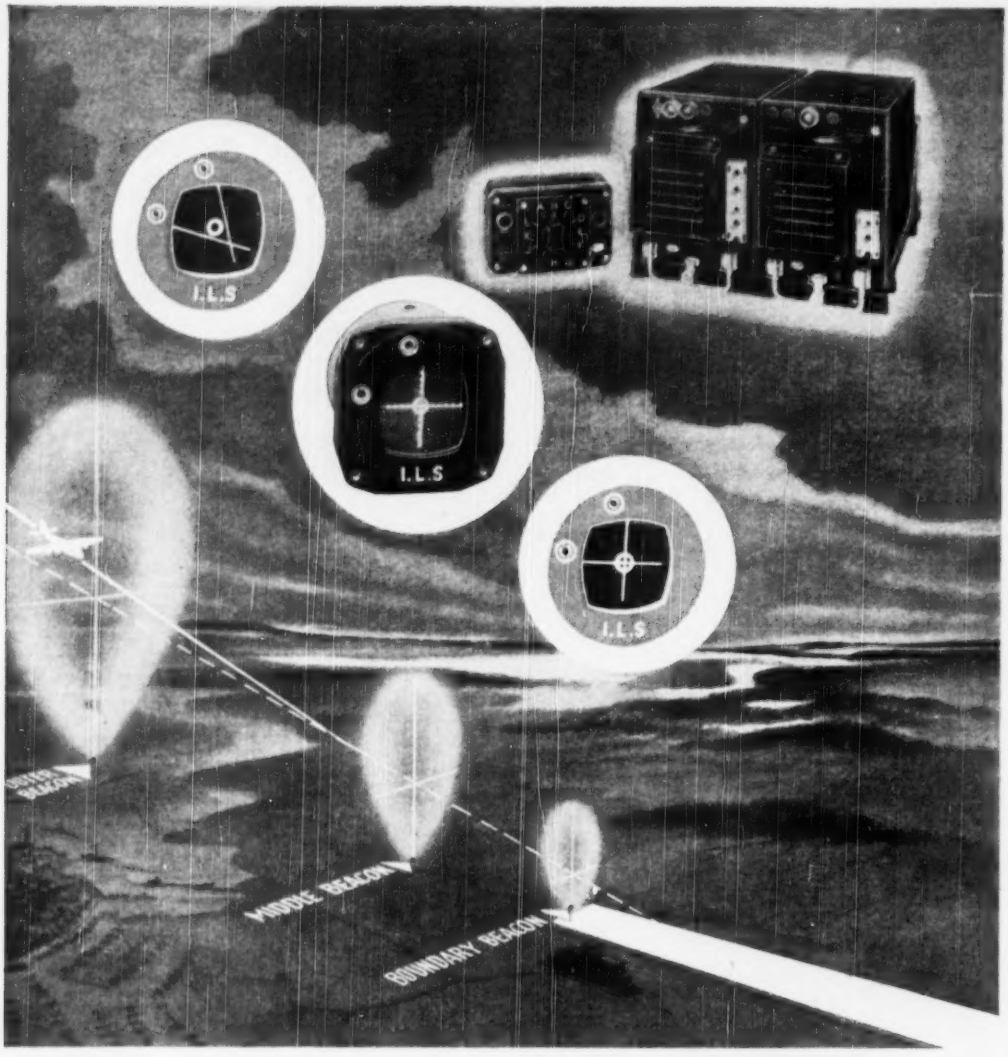

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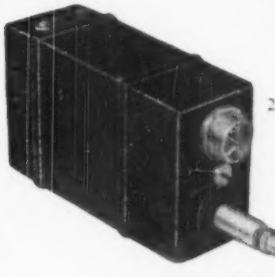

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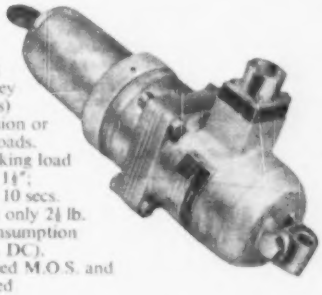
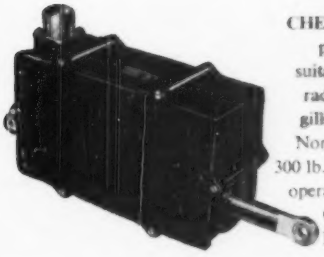
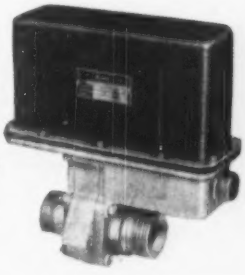


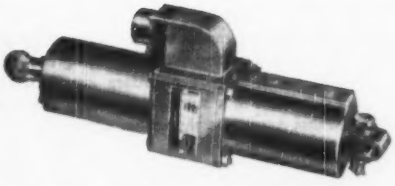
COUGAR This inline unit is (like all Plessey linear actuators) capable of tension or compression loads. Maximum working load 400 lb.; stroke 1¼"; operating time 10 secs. Total weight is only 2¼ lb. and current consumption 2.9 amp. (24 v. DC). Fully tropicalised M.O.S. and A.R.B. approved



CHEETAH A more powerful actuator suitable for operating radial engine cooling gills, etc. Weighs 4 lb. Normal working load 300 lb.; max. stroke 3½"; operating time 13 secs. Current 2.25 amp. Fully tropicalised.



LYNX This fuel cock unit incorporates the Vickers-Armstrongs A1792 Mark H "P" type reciprocating action cock. Operating time 1.8 secs; total weight 3¼ lb.; current 1.1 amp. (24 v DC). Fully tropicalised.



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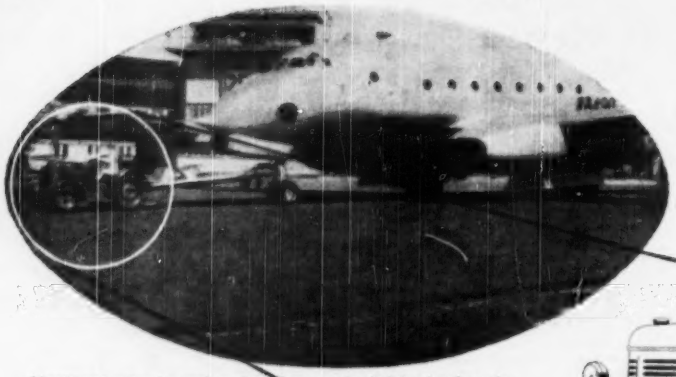

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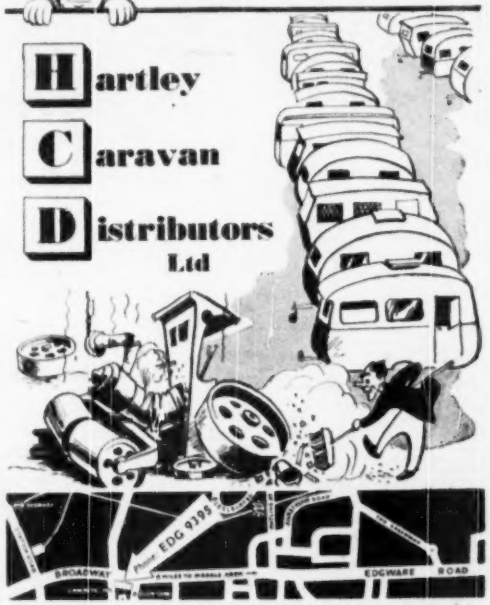

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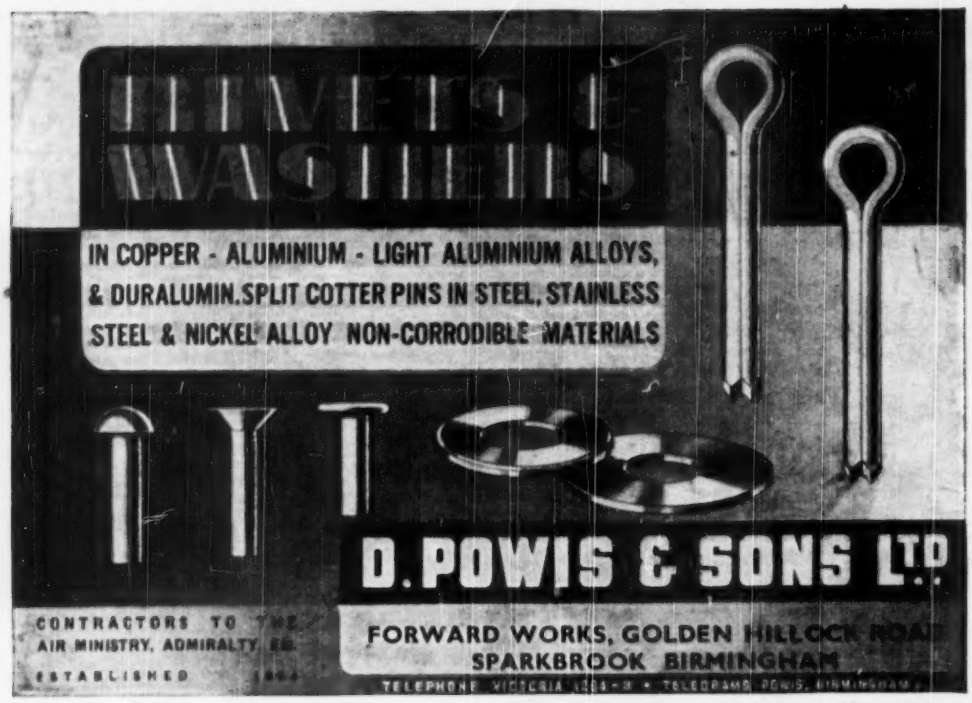
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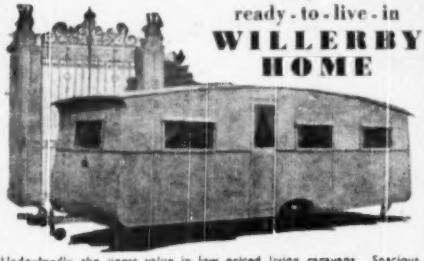

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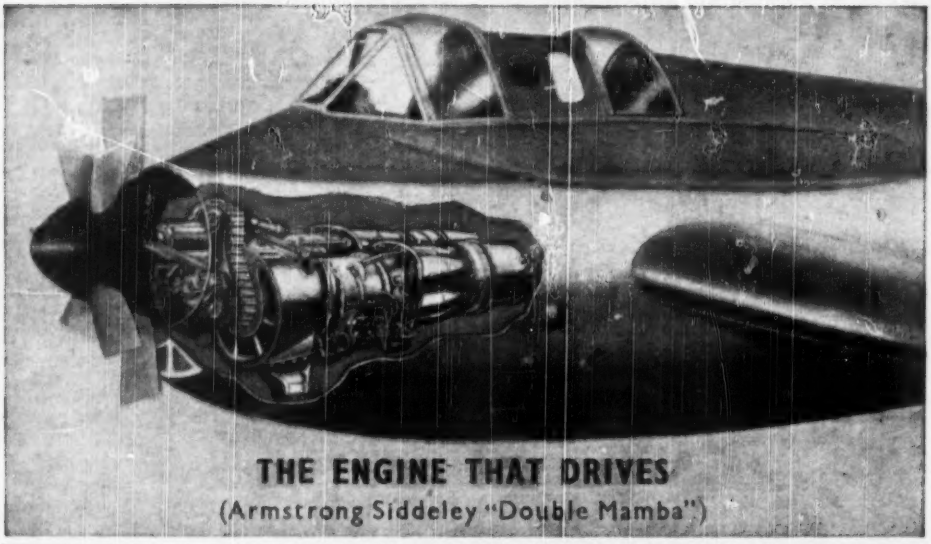

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Human Problem

DESPITE all our efforts this country has become a world-centre of shortages. In a steady cycle they come round, until every sort has been felt: food, petrol, tobacco, whisky, electricity, water—and now, once more, coal and raw materials. For most of us, money is also "in short supply" and tempers are occasionally added to the list.

But one impending shortage which can, and must, be avoided in the New Year, even as we plumb and scrape bottoms of pockets, barrels and stockpiles, is that of pilots. In the past few years the emergency value of private and commercial pilots has been admitted often enough. The emergency itself is now upon us, and all civil flying and training resources should, and must, be mobilized without further delay. Admittedly a start has been made: there is now an Auxiliary transport squadron; each year a handful of A.T.C. cadets is able to take lessons in flying; and University squadron and V.R. activities have been extended. Yet this is just a beginning.

Miraculously, a very fair nucleus of a large potential civil flying movement has managed to keep alive in the clubs and small operating companies; the ability, experience and enthusiasm are still there, and now is the time to use it to the country's advantage. There should be flying scholarships for at least four times as many A.T.C. cadets, and proficient past-members of the A.T.C. should be accepted as direct entrants in the V.R. aircrew categories without previous pilot training. A bonus should be paid for all Private Pilots' Licences gained in the clubs by men fit and willing to offer their services in the event of their being called upon. Every holder of a Commercial Licence should be given the opportunity of up to a month's paid experience and training each year in our depleted R.A.F. Transport Command. Possibilities of several other such schemes come to mind and some at least should be put into practice at once. Though our production of aircraft can be stepped-up considerably, and hundreds more may be acquired from America, aircrew are less easily come by: and inevitably, it takes time to train them to the required pitch of efficiency.

The Mig Fighter

IN the wars of 1914 and 1939 there were periodic "menaces," "scares" and "scourges" which, though uncomfortable or even alarming at the time, proved salutary in their influence on the Allied technical effort. We have in mind the "Fokker scourge" of 1915; the disagreeable surprises sprung by the Fw190 on its introduction in 1942; the menace of the Japanese "Zero" fighter in the Pacific; and the superior qualities of speed and fire power demonstrated by the Me262.

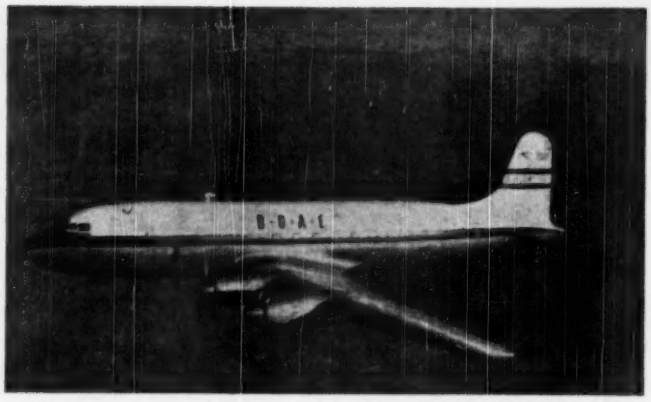
Now, in Korea, we see a new Soviet fighter—the Mig-15—quite outstripping the latest U.S. naval machines in speed and—perhaps even more serious—turning in a shorter radius. An American naval officer, lately returned from a month's observation in Korea, asserts that the situation *vis-à-vis* the Grumman Panther and the Soviet fighter is "similar to that early in the last war between the American fighters and Japanese planes." Notwithstanding this observer's reassurance that the U.S. Navy are beating the Migs with "more rugged planes and better tactics and teamwork," the situation is, to say the least, disquieting.

The Panther, of course, being a carrier-borne type, is somewhat handicapped on the score of weight; but, on the other hand, its wing loading, by current standards, is believed to be moderate, and manœuvrability at combat weight good. In speed and climb the original Allison-powered type is thought to have proved somewhat disappointing; even so, it is probably comparable with the Attacker (yet to come into service with the Royal Navy), while the latest production version, with the Tay turbojet, should be little inferior to the still-distant Sea Hawk.

While there is no immediate cause for alarm, there is good reason for concern: the Western Allies are fortunate in having made the acquaintance of the new Soviet fighter gradually and on so modest a scale. The news that 670-m.p.h. Sabres have lately fought two successful actions against the Migs is indeed welcome.

BRITAIN'S AIRLINE OUTLOOK

New Equipment and its Promise : Indications of a Brighter Future



Resplendent in the new B.O.A.C. colour scheme: one of the Hermes IVs, which—together with the Ambassadors soon to be delivered to B.E.A.—represent the initial step in supplying " designed for the job " equipment to British airlines.

OF the world-wide interest being shown in the current and projected civil creations of British aircraft constructors, it may be said that the value of having a bird in the hand as opposed to "two on the drawing-board" was never more readily apparent. Since the world's first turboprop airliner—the Vickers Viscount—made its maiden flight some 28 months ago, the eyes of international aviation have been focused intently (and enviously) on British developments in pure-jet and turboprop-powered aircraft.

In aircraft-manufacturing circles abroad our acknowledged lead in this sphere caused—at least initially—some very hard thinking. Could it be that the British, known just after the war to be operating uneconomical and outmoded ex-military transports, were thinkfng a decade ahead in the matter of commercial aircraft design? This, as we now know, was the case—and still is to-day—though the lead is of the less spectacular but still valuable order of three years.

Sixteen months ago the world's first pure-jet airliner, the de Havilland Comet—a triumph of British vision and enterprise, built as it was to an order with a guaranteed-performance clause—made its first flight; and a month later the Avro Canada Jetliner also made its successful debut. Designed for short-haul, high-density traffic, the Derwent-powered Jetliner is, like the Comet, already in an advanced stage of development and stands almost ready to undertake its first commercial trials.

Numerous foreign projects for competitive types have failed to progress far beyond the design-study stage. This has been due primarily to lack of funds and secondly to a reluctance to exchange an affirmed policy of consolidation in air-transport affairs for the adoption of revolutionary and untried types, however attractive they may appear to be. Whether such decisions will prove to have been justified or ill-advised remains to be seen. Present indications are that the less enterprising nations may have cause to regret their hesitancy.

If, at the beginning of 1950, doubts remained in the minds of potential passengers or operators as to the advantages and general desirability of turbine-powered airliners, the progress shown by our prototypes should have dispelled most of them.

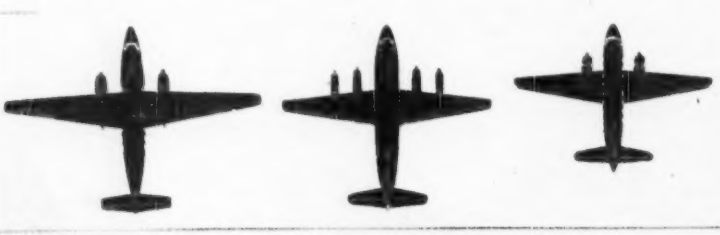
In July, the Vickers Viscount became the world's first turboprop airliner to go into scheduled passenger-service. Operational experience was thus gained under normal commercial conditions and passengers and operators alike were able to obtain first-hand knowledge of its unique qualities.

It is now universally accepted that the eventual application of gas turbines to commercial operations is inevitable; it is therefore good to see that, while foreign constructors still watch, wait and wonder, British turbine-powered airliners have already flown more than 8,000 engine-hours. A quarter of this total has been logged by the two prototype Comets, the remainder by the two prototype Viscounts, the Armstrong-Whitworth Apollo and the Hermes V.

The prototype Viscount—introduced by B.E.A. on services from Northolt to Paris and Northolt to Edinburgh during the four weeks of the peak traffic season last summer—carried, in all, 1,838 passengers and made 88 flights; this entailed 122 hours of commercial operation in all weathers. Both the Viscount and the Comet have been fully engaged during the year in spreading the turbine-power gospel by trials and demonstration flights to many European capitals. At all airports at which they called, these two aircraft left authorities not only favourably impressed, but—when the commercial capabilities were fully realized—frankly envious.

It is with such aircraft as these, fully tested and approved for commercial operation, that we are now planning to put new lifeblood into the air-transport industry. The post-war struggles of our two nationalized Corporations have been long and arduous and, although they have done their utmost to improve on unhappy financial results, they have been hampered until recently by a multiplicity of uncompetitive aircraft types.

B.E.A. have, like other operators, obtained excellent service from their Vikings and the well-developed Hercules engines installed. Last year the Vikings showed an average utilization of 1,497 hr per aircraft and accounted for 63.7 per



These scale silhouettes of B.E.A.'s new types—Ambassador (left) and Viscount (centre)—show them to be considerably larger machines than the Viking (right) which has been the Corporation's mainstay in post-war years.

The Comet (left) is visibly smaller than the Stratocruiser, seen adjacent, but the Bristol 175 (right) is fractionally larger.

cent of the Corporation's total revenue-mileage. The last B.E.A. utilization figure for those faithful old work-horses, the Dakotas, was 1,381 hr, while the safe and popular but now uneconomic Rapides flew an average of 648 hr on B.E.A. routes.

From the average block-speed attained by Vikings—168 m.p.h. on an average stage-length of 358 miles—it is clear that these reliable machines have just about reached the limit of their capabilities. If any substantial improvement is to be achieved in operating results, B.E.A. must use very much faster and more economic types to give higher utilization and, consequently, lower operating costs. To this end the efforts of our aircraft industry have been devoted, and the equipment which it now offers for use on B.E.A.'s Continental routes augurs well for the future.

Since the primary objective of the commercial operator is to realize a profit on his investment, it is obvious that, notwithstanding the attractiveness of other features, an aircraft will be of purely academic interest unless it can be used to economic advantage on the operator's route-structure. The aircraft of B.E.A.'s future fleet will be particularly suitable. The 40-passenger Viscount 700 series (of which twenty-eight 701s have been ordered for delivery at the end of 1952 and introduction into service in the following spring) will actually be cheaper to operate per-ton-mile over ranges up to 600 miles than would a comparable piston-engined machine. Cost per aircraft-mile is estimated at 5.2s, which is even less than that of the Vikings now used.

More immediate advantages will be derived, however, from the use of a highly competitive piston-engined airliner, the shapely 47/49-seat Airspeed Ambassador, which, with a direct operating cost of 5.6s per aircraft-mile, promises to show a notable advance on any other transport in this category. With its excellent view from the cabin windows and good single-engine performance it should rank high in passenger appeal. The Ambassador's large capacity will be especially useful for absorbing the high-density peak-period traffic. For the future, the possibilities of a re-engined Ambassador have not been overlooked; its aerodynamically excellent, pressurized airframe is well-suited to turboprop power and from the point of view of standardization alone four Darts will, no doubt, be first choice with B.E.A.

On internal routes the Dakota will still be used, although in a regenerated form. With an almost completely rebuilt interior, new entrance door with integral stair, and conversion to two-crew operation (V.H.F. coverage of United Kingdom will eliminate the need for W/T), the new Pionair class, as it is named, will carry 28 passengers at substantially reduced operating costs. In fact, B.E.A. considers that the cost of conversion is likely to be recovered within the first year of operation.

Other Dakotas—two fitted experimentally with Darts—are to look after B.E.A.'s freighter traffic until 1956. By this time both the freighters and the Pionairs will be due for replacement and, failing the appearance in the meantime of suitable new equipment, rebuilt and modified Vikings—possibly with different power units—may be called into service for freight and domestic duties.

A small number of Handley Page (Reading) Marathons will gradually replace the ageing Rapides, which, because of the short stage-lengths of the "social services" on which they are used, of their small revenue capacity and of increasing maintenance costs, are considered too expensive to run.

If B.E.A.'s need for competitive equipment is great, that of B.O.A.C. is infinitely greater. For some years past B.O.A.C. has made do with a very mixed fleet of wartime conversions and dollar-consuming American transports. Financial progress has been steady but slow—an uphill fight waged in the face of bitter setbacks such as the unforeseen withdrawal of Tudors from South American routes. Although some measure of improvement will undoubtedly result from the replacement of the luxurious but (remembering their bases) costly Solent flying-boats by the equally comfortable and more practical Hermes IVs, it is again obvious that to achieve real success B.O.A.C. must also await the blessings conferred by turbine power. The Corporation has already established the nucleus of a Comet fleet to prepare for the introduction of this machine, next year, on experimental services to Cairo and Karachi, on the London-Australia route. With its payload of 12,000lb (the maximum authorized to date) for a 3,500-mile range at a cruising speed of 490 m.p.h. at 40,000ft the Comet is the aircraft most likely to extricate B.O.A.C. from its financial predicament.

A concise description of the pleasures of Comet flying was

Well known for its sterling qualities as a passenger transport for B.O.A.C., the popular Argonaut may eventually end its days as a worthwhile freighter conversion.

BRITAIN'S AIRLINE OUTLOOK . . .

given by the Corporation's journalist chairman, Sir Miles Thomas, when he spoke of the "queer, unbelievable quality of the aircraft's rock-steadiness in flight and of the absence of ordinary indications of speed . . . the sound inside is a pleasant, swishing drone at cruising paces, developing to a suggestion of an incipient roar when the jets approach full power for the climb."

One of the most important features of the Comet is the hitherto unattainable degree of maintenance simplicity which it offers. Since it has been estimated that approximately five shillings of every pound paid by an airline passenger for his ticket goes towards maintenance, herein lie great possibilities for improving financial results. This characteristic also opens up possibilities of inter-city runs, even when they are less than the 1,500-mile stage-length to which the Comet is best suited.

The main advantage of the Comet to the operator lies in its high cruising speed which, though entailing a rather higher direct operating cost per aircraft-mile than would a comparable piston-engined type, will yet be up to 20 per cent cheaper per ton-mile of payload. At an envisaged annual utilization of up to 3,000 hr the Comet would yield at least 50 per cent more revenue in the year. A given service could be operated by a smaller number of Comets than of any other slower and less advanced contemporary airliner.

Though intended for the Empire trunk routes and possibly the longer routes of B.W.I.A. and C.P.A., it has also been suggested that, with the aid of flight-refuelling, the aircraft could be profitably employed on North Atlantic services. In this connection, Mr. C. H. Latimer-Needham's calculations indicate that a flight-refuelled Comet, powered by "centrifugal" Ghosts would give a better profit figure (£0.132 per revenue ton-mile) than would a Constellation (£0.08 per revenue ton-mile) over 2,400-mile stage-lengths.

Plans to install higher-powered, axial-flow Avons which would give a considerably better specific-consumption figure in a number of Comets for B.O.A.C. also bear out the contention that the Comet can be adapted to play its part in catering for the growing volume of air traffic on the North Atlantic routes.

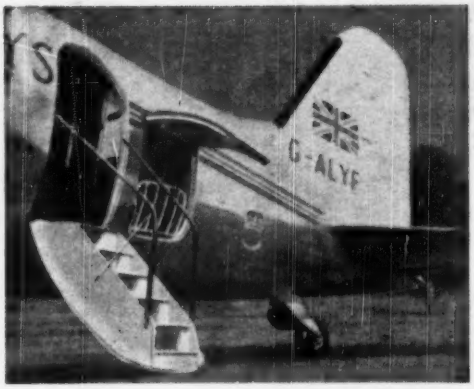
When it is considered that it is within the capabilities of a single Comet to provide a daily return service across the Atlantic on six days a week, leaving one day for maintenance, it is apparent that we are indeed on the threshold of a revolution in airline economy. By whatever means the ability to make direct crossings is achieved, it is of great importance that this ultimate goal should be attained.

The Versatile Type 175

Although still nominally a medium-range aircraft, the Bristol 175 shows signs of being unusually versatile; it is being built to replace all four-engined airliners now in use on B.O.A.C. passenger services including, ultimately, the Stratocruisers. Twenty-five 175s are on order for B.O.A.C., and it is hoped that the ideal of a standardized fleet will be approached when Comets and 175s alone comprise B.O.A.C.'s passenger-carriers. The most efficient type from among those now in service may eventually be retired, gutted, and reintroduced as a long-range freighter. Eyes are turned upon the Rolls-Royce-engined Argonauts in this connection.

Bristol 175s, with four Proteus turboprops, are expected to do all the Constellation does—and better. They are larger aircraft than most people imagine, and are designed to cruise at 330 m.p.h. Components of the prototype (some notes on which appear on p. 627) are now under construction.

Looking even further into the future, there is the possibility of a return to commercial flying-boats. The three 140-ton Saunders-Roe Princesses have been ordered by the Ministry of Supply with a view to their operation by B.O.A.C., and flight trials with the first prototype are scheduled to begin next summer. The estimated performance of such a craft—which, powered by ten Proteus turboprops, will cruise at 380 m.p.h. and have a range of 5,500 miles, carrying 105 passengers—invites serious consideration of a return to this always attractive but hitherto uneconomic method of transport for specific long-distance routes such as those to South Africa and South America.



Built-in passenger steps are but one of the many improvements incorporated in B.E.A.'s rebuilt Dakotas—now the "Pionair" class.

During the past year the Bristol Brabazon I has, on occasion, emerged to prove to the world that it can and will be handled not as some monstrous aeronautical freak, but as a normal airliner capable of operating from normal airfields and of manœuvring on the ground as easily as any of its lesser brethren. It seems unlikely that the prototype will ever be used on the North Atlantic runs, although the Proteus-powered Mark II now under development (capable of carrying up to 100 passengers in great comfort non-stop from London to New York at 300 m.p.h.) is also an aircraft whose performance the Corporation might put to good use.

For the Longer Routes

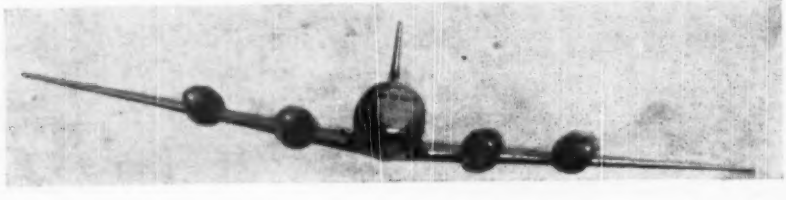
It will be seen from this brief review of proposals for B.O.A.C.'s future fleet that, although thinking is now well defined on the replacements for medium-length stages such as the Empire routes, no very definite plan has been announced for an efficient long-range transport of high payload-capacity—unless one or both of the basic types discussed above are to be adapted to this work.

The Brabazon II is still merely a proposition from the operational point of view and is, in any case, still some way off. There have been intimations recently that the flight-refuelling technique will not be applied to the Comet and that any consideration of using this type on Atlantic routes will depend on better range figures being achieved and rapid advances made in traffic control procedures to eliminate the need for large fuel reserves.

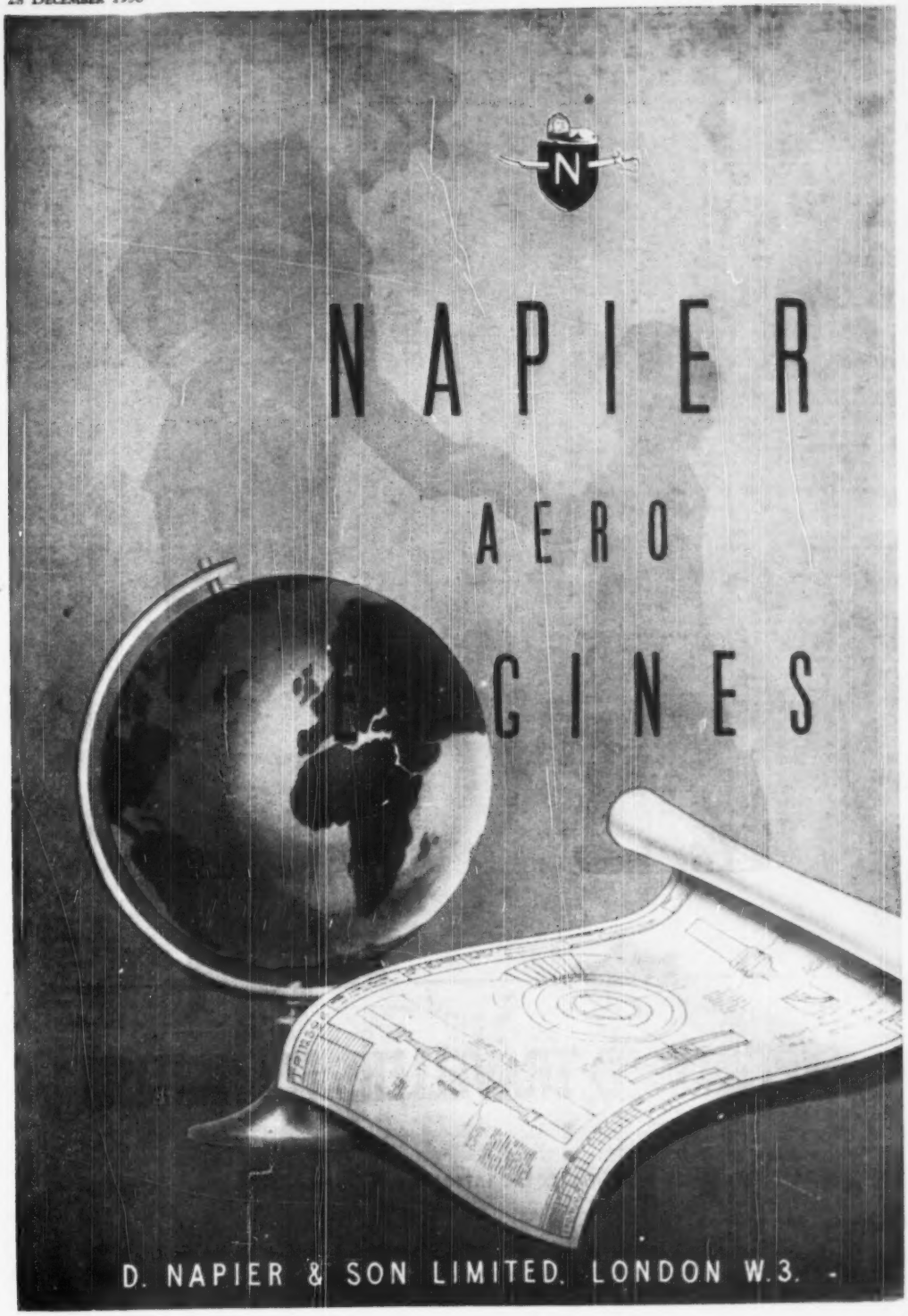
That the introduction of fast jets into existing traffic-patterns does not in itself constitute a major problem in good visibility at present traffic densities is a statement which will hardly hold true if the flow of traffic into terminal airports continues to increase at the rate at which it has grown during the past three or four years. Unless, therefore, drastic reductions are made in stacking periods at international airports—and such a tendency is not yet apparent on this side of the Atlantic—it seems that the provision of large fuel reserves will continue to influence the type and design of airliners used on long oversea stages for several years to come.

Though the Comet is undoubtedly a brilliant star in our galaxy and is capable of bringing about very great improvements in B.O.A.C.'s operating results, we must not lose sight

(*Concluded on page 629*)



The clean frontal aspect of the Bristol 175—of which this is a model—show it to be an attractive craft which promises well from the commercial viewpoint. The tailplane—here obscured by the wing—is particularly low-set.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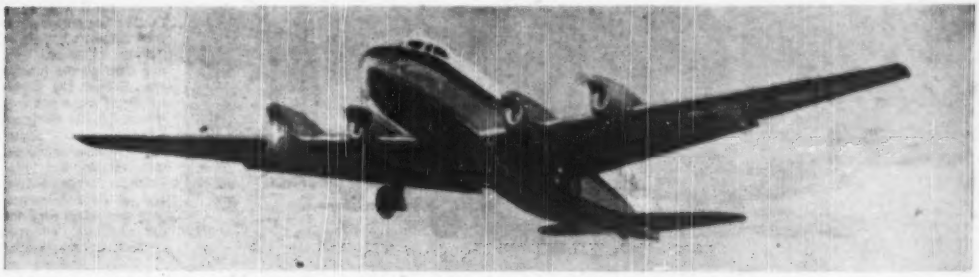


PROMISING NEWCOMER : Progress made in flight trials of the de Havilland Heron feederliner suggests that it will join the twin-engined Dove as a contender for American contracts. The prototype Heron, shown with the fashionable white fuselage-top, is undergoing tropical trials in Africa.

HERE and THERE

Bristol Abroad

DURING a recent visit to Australia Mr. Verdon Smith, joint managing director of the Bristol Aeroplane Company, discussed further use of the Freighter by both the R.A.A.F. and Australian National Airways. Other recent travels from Filton were made by Dr. S. Hooker (deputy chief engineer, engine division) and Mr. Farrar (aircraft division), who have been surveying guided-missile developments in America.

Rotary Progress

THREE Hiller 360 helicopters recently completed a two-month demonstration tour of France. Visiting all the main cities and towns, they flew for 500 hours, made 6,500 landings and gave 13,000 people their first experience of helicopter-flight.

Italy is setting up a helicopter "mercy" service at Palermo to fly doctors and medicines to 34,000 inhabitants of islands around Sicily. The type of helicopter to be used has not been stated. Islands which, in time of emergency, will benefit from the service include Pantellaria, Ustica and Lipari.

Welcome Revival

AS a departure from its periodical documentary-film programme, the Royal Aero Club will show—at Londonderry House on January 9th—*The Way to the Stars*, a classic war-time aviation film with a large cast including Michael Redgrave and John Mills. Members and their friends are advised that there will be no admission after the beginning of the programme at 6.15 p.m.

Mr. William Courtenay, who recently returned from Korea, will give a talk on the events leading up to the Korean war, illustrated by large-scale maps, at Londonderry House on January 23rd. Two weeks later, on February 6th, he will follow up with a colour film about the Korean campaign.

I.A.S. President Elected

REAR ADMIRAL LAWRENCE B. RICHARDSON has been elected president for 1951 of the American Institute of the Aeronautical Sciences. He succeeds Mr. J. H. Kindelberger, the chairman of North American Aviation. Admiral Richardson, who retired from the U.S.N. in 1946 after over 20 years' service in naval aviation, is at present the director of research and development, Fairchild Engine and Airplane Corporation. Next year's I.A.S. vice-presidents are executives of United Air Lines, Convair, Grumman and Boeing.

Australia's Jets

CONFLICTING reports have been received from Australia concerning the supply of jet aircraft to the R.A.A.F. A statement that the Commonwealth would buy jet bombers from America was recently denied by the R.A.A.F. Canberras, now in production, were said to be the only jet bombers on order; the first production models would be delivered late in 1952.

The only other jet aircraft known to be in production or under development in Australia are the Nene-Vampire; Hawker P.1081; a Commonwealth Aircraft two-seat all-weather fighter; and the small Adder-powered prototype (eventually destined for pilotless flight) now being flight-tested at Woomera. The strength of the R.A.A.F. will soon be increased by the delivery of 36 Gloster Meteor 8s from Britain.

French Fighters

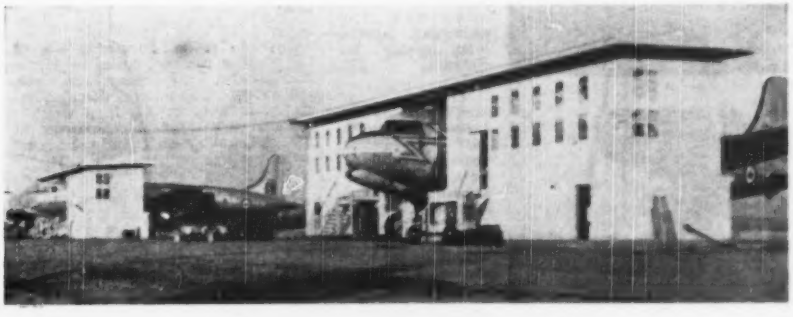
FOLLOWING a visit to France, A. Cdre. Payne, of the *Daily Telegraph*, reports that the effective fighter strength of the French Air Force consists of 144 D.H. Vampire 5s—nine squadrons of 16 aircraft. The F.A.F. has three fighter wings, each of three squadrons, based at Dijon, Rheims and Friedrichshafen.

The next type of fighter to go into service with the F.A.F. will be the Nene-powered Dassault 450 Ouragan; the first production aircraft made its initial flight last month and will soon be delivered. A swept-wing version of the Ouragan, the Dassault 452 Mystère, is being prepared for its first flight at Istres.

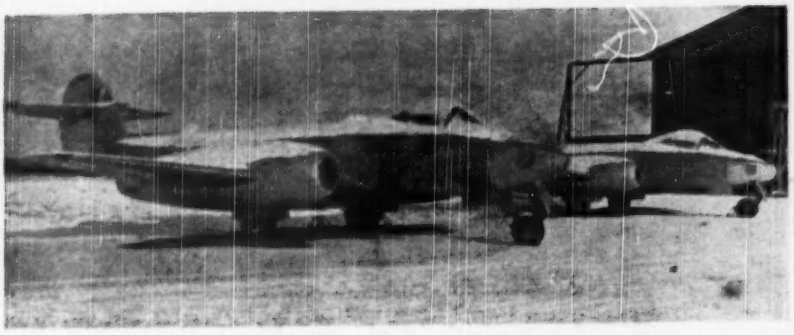
Introducing the Airlift

DESIGN-STUDIES have been submitted to the U.S. Air Force and Navy by the Glenn L. Martin Company for a proposed military version of the 4-0-4 civil transport, named the Airlift 4-0-4. The major distinguishing features of this version would be clamshell loading doors beneath the rear fuselage, with a built-in ramp, and the provision of wing-tip tanks.

The adoption of turboprops is suggested, but the first version would have



HALFWAY HOUSES : To give "snug-as-a-bug shelter for mechanics" working on the Canadair North Star transports of No. 426 (Thunderbird) Squadron, R.C.A.F., these servicing sheds have been built at McChord Air Force Base, Tacoma, Washington. From McChord, the Squadron flies one North Star daily to Tokyo, carrying men and material for the United Nations forces in Korea.



WAITING IN THE COLD : Seasonable scene from Gloster's airfield at Moreton Valence. Ice and snow on the runway has delayed the flight-testing of these two new Meteor P.R.10s. Designed for high-altitude photographic reconnaissance, this version has provision for vertical, oblique and forward cameras. Long-span wings are fitted for better control characteristics at height.

HERE AND THERE . . .

two 2,500 h.p. Pratt and Whitney R-2800 engines, giving a cruising speed of 270 m.p.h. over a 1,500-mile range with 15,000lb of cargo. As a trooper, the Air-lift's capacity is estimated as 54 men, with equipment, for a 1,900-mile range.

1950 Guggenheim Medallist

FOR his "outstanding leadership in aeronautical research and fundamental contributions to aeronautical science," Dr. Hugh Latimer Dryden, Director of the American National Advisory Council for Aeronautics, has been awarded the Daniel Guggenheim Award for 1950. In 1949, Dr. Dryden delivered the 37th Wilbur Wright Memorial Lecture to the Royal Aeronautical Society, of which he is a Fellow.

Latest Sabre Production

NORTH AMERICAN AVIATION recently delivered to the U.S.A.F. the last F-86A mark of Sabre—the version which set up the world's speed record of 670 m.p.h. in September, 1948. Sabres now in production are the F-86D all-weather fighter and the F-86E. Outwardly, the "E" resembles the F-86A but incorporates a number of modifications, including a movable tailplane for better control at high subsonic speeds. All the F-86E's controls are of the powered, irreversible type.

Flying in the Canuck

A MUCH-ENVIED man is Mr. Ronald A. Keith, editor of *Canadian Aviation*, who was lately privileged to fly with S/L. W. A. "Bill" Waterton in the Avro-Canada CF-100 Canuck all-weather fighter. In Mr. Keith's opinion climb is the Canuck's most impressive feature. S/L. Waterton told him that the controls were exceptionally light—"a bit too much so for general use"—and some adjustments would be necessary in putting a little more weight into the feel of the stick.

"Purpose of our flight," writes Mr. Keith, "was to search for a suspected deflection of the undercarriage doors, believed to be the cause of a perceptible vibration under certain flight conditions." He relates how, in a series of 2g turns, "Bill" operated a remote-controlled ciné camera trained on the belly bay. Examination of the film established that there was, in fact, such a deflection, which had to be corrected.

Mr. Keith refers to level flight at 25,000 ft, and at a speed "something over 10 miles a minute."

NEWS IN BRIEF

MR. Harold Chapman, A.F.R.Ae.S., who is now managing director of Armstrong Siddeley Motors, Ltd., has been elected to membership of the Institute of Mechanical Engineers.

* * *

Probably the first London building designed as a possible landing-ground for helicopters is the flat-roofed warehouse now being built in Euston Road for F. J. Edwards, Ltd., manufacturers of machine-tools. Similar facilities are planned for the company's projected machine-centre in Birmingham.

* * *

Support clamps for flexible and rigid piping and electric cables are the subject of data sheets issued by Avica Equipment, Ltd., 50, Pall Mall, London, S.W.1. Depending upon dimension and diameter, the clamps are available with either synthetic rubber or asbestos-braid cushions, the cushioning material being readily replaceable.

SILHOUETTES AT SEA : A Douglas AD-1 Skyraider strike aircraft, waiting to take off from the U.S.S. "Princeton," displays new type naval identification-marking. The "Princeton," a recent addition to U.N. naval forces off Korea, also carries Corsairs and Panthers.

The Glenn L. Martin Company announces the formation of a design development department in its engineering division; it will be headed by Mr. G. S. Trimble, who was formerly chief of the aerodynamics department.

* * *

E. A. Rumbold and Co., Ltd., recently held their annual senior staff dinner and dance in London; as on past occasions, the event was a success in every way.

* * *

New circular saw (4in diameter) and metal-shearing attachments for standard portable electric or pneumatic drills are described in leaflets issued by Kingsbourne Products, Ltd., 3, Eagle Street, London, W.C.1.

* * *

The Northern Aluminium Co., Ltd., announces that Mr. A. K. Jordan has been appointed assistant general sales manager. Associated with the Aluminium, Ltd., group of companies for 21 years, he has been export sales manager with the Aluminium Company of Canada, Ltd.

* * *

Helvin—"the elastic plastic"—is the subject of a brochure issued by Hellermann Electric, Ltd., Tinsley Lane, Crawley, Sussex. The material described is a special form of P.V.C., from which is made a wide range of components for the electrical, aircraft and automobile industries.

* * *

A wide range of Miles electric actuators and associated equipment are described and illustrated—with photographs and dimensioned drawings—in a new catalogue issued by Western Manufacturing Estate, Ltd., The Aerodrome, Reading, Berks.

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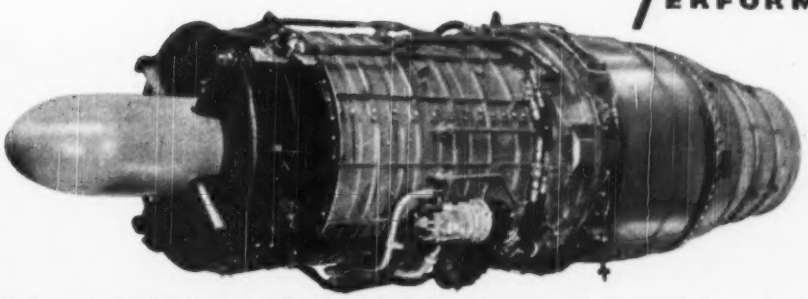

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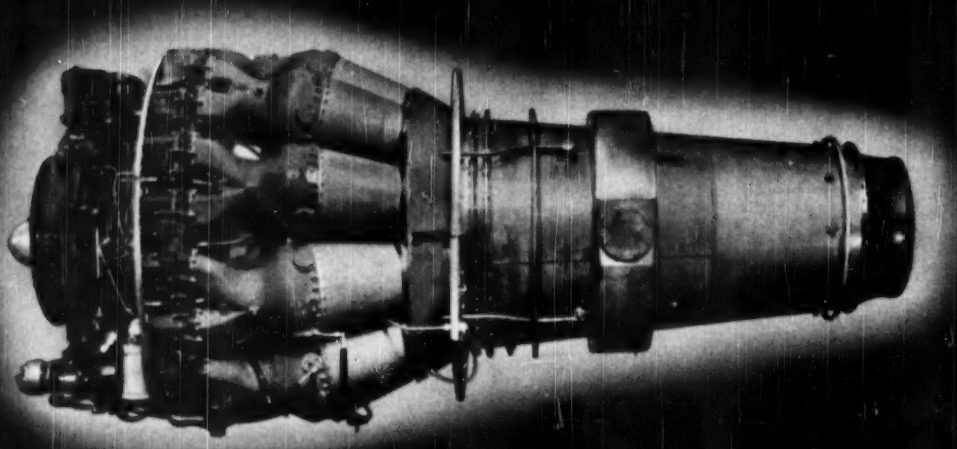

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No. 6 SQUADRON R.A.F.

History of a Famous Army Co-operation Unit

Part I: From 1914 to 1949

By JOHN YOXALL

Brigadier General J. H. W. Becke who, as a captain, was the squadron's first commanding officer on its formation in 1914.

THE official notification of the formation of No. 6 Squadron appeared in Royal Flying Corps (Military Wing) Orders for January 30th, 1914, in the following terms: "Capt. J. H. W. Becke will carry out the formation of No. 6 Squadron, commencing tomorrow. No. 6 Squadron will be stationed at South Farnborough." Capt. Becke came from No. 2 Squadron and, with the then recent handing-over of all airships to the Naval Wing, a number of No. 1 Squadron personnel were posted to the new unit. The man-lifting-kite flight of No. 1, under Maj. the Hon. C. M. P. Brabazon, was also for a while with No. 6.

At that time officers of squadrons were allotted experimental work to do, and one of the N.C.O.s in the photographic flight was Sgt. F. Laws who, as G/C. Laws, was ultimately to become one of the famous names in air photography; he only recently retired from the Service.

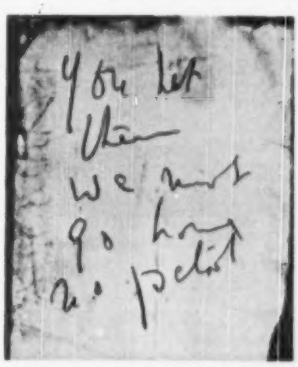
On the flying side, the squadron had on strength two 70 h.p. Renault-engined B.E. tractor biplanes and two Maurice Farman pusher biplanes. Comparison of the performance of these aircraft with the unit's present-day D.H. Vampires is interesting, especially bearing in mind that Sir Geoffrey de Havilland also designed the B.E. The B.E. had a top speed of 65 m.p.h. and could climb to 3,000ft in nine minutes. The Farmans had about the same top speed but took another six minutes to get to 3,000ft. Their cost was roughly £1,000 each.

Not only were officers expected to do experimental work but squadron commanders had to do experimental test flying. Capt. Becke did his share of this work, and when, early in 1914, the Royal Aircraft Factory (now the R.A.E.) at Farnborough produced the R.E.5—a bomber/reconnaissance development of the R.E.1—he was detailed to carry out trials to measure "run before rising." He tested the B.E.2, Maurice Farman, R.E.1 and R.E.5 against a 10-15 m.p.h. wind. A full load was carried and the figures obtained were: B.E., 67 yd; Maurice Farman, 81 yd; R.E.1, 88 yd; R.E.5, 52 yd. The improved performance of the R.E.5 was to some extent due to the employment for the first time of streamline wires—later known as Rafwires. Until then all wires had been either of round section or strip metal.

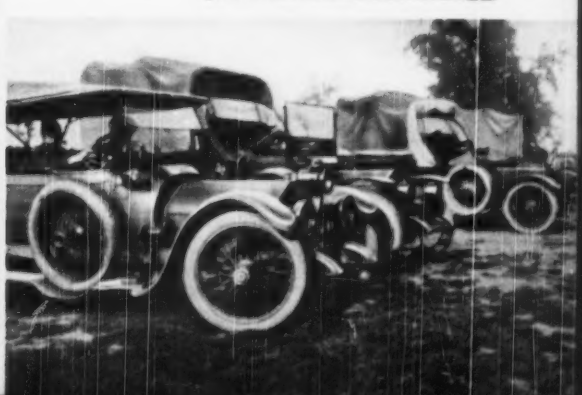
With the other squadrons already in existence, No. 6 attended the concentration camp (in those days the word had a less sinister connotation) held at Netheravon in June, 1914. On the outbreak of war, however, the squadron was practically denuded of all its aircraft and personnel to allow Nos. 2, 3, 4 and 5 to go abroad in full strength.

Major Becke then started to build up afresh. Some new R.E.5s arrived, but No. 6 had hardly got going again when it had to sacrifice its principal flight to replace casualties in France. The reinforcements were sent over in the charge of Major Becke and included C Flight of No. 4 Squadron; the flight had remained behind at Dover for patrol duties over the Channel. One of the six R.E.5s was flown over by Hereward de Havilland, who had joined the squadron after being a test pilot at the Royal Aircraft Factory, where his brother Geoffrey (now Sir Geoffrey) was a designer. Hereward de Havilland is now a joint managing director of Airspeed, Ltd.

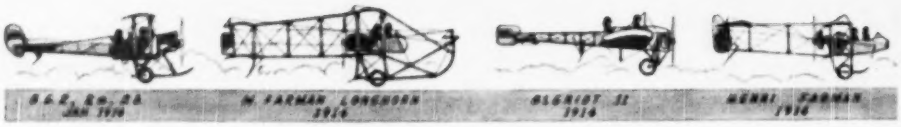
The message slip dropped by a pilot of No. 6 on October 20th, 1914.



The Crossley cars and tenders which formed the major portion of the squadron transport in the first year of the war.



Servicing under difficulties: A B.E. fuselage is pushed through mud on to the airfield at Bailleul, 1914.



No. 6 SQUADRON R.A.F.

After delivering the R.E.5s to No. 2 Squadron, Maj. Becke started to build up yet once more and, on October 4th, 1914, No. 6 was ordered to prepare for active service abroad with the 7th Division and 3rd Cavalry Division, which, under Sir Henry Rawlinson, were to attempt to save Antwerp.

An advanced landing party under Capt. H. C. T. Dowding (now Air Chief Marshal Lord Dowding of Bentley Priory, who commanded the fighter force in the Battle of Britain) left for Southampton to embark for Ostend. The same day 12 aircraft—six B.E.2a, two B.E.8s and four Henry Farmans—left by air for Dover. By the next day, when they arrived at Bruges, only eight were serviceable. That some aircraft also went by sea is evidenced in the following recollection by Maj. Hereward de Havilland:—

"On being posted to France, the aircraft were taken by road to Gosport, the fuselages being towed behind squadron lorries. After some miles of this, in thick dust, the plain bearings of the undercarriage wheels started seizing up and the remainder of the trip was completed with chaps sitting on the axles, armed with tins of oil and grease.

"Various innoculations, followed by the Bay of Biscay, had knocked a fair percentage of the squadron rotten by the time it arrived at Saint Nazaire, where the aircraft were assembled and test-flown before leaving for the front. My only memories of this stage are of the girl in our village billet, the beetles in my bedroom, and getting into a flat spin on my R.E.7.

"My first job over the line was to bomb troops in the Lille area with small red-handled bombs, which one chucked over the side. My observer was Bob Hart, armed with a .303 Service rifle. I had a Mauser pistol. We didn't see any troops, but got rid of the bombs, and used up our ammunition against what turned out to be a French Voisin with no results. We were hit quite extensively by anti-aircraft fire at 6,000ft and had two separate forced landings on the way back to base due to fuel-system trouble."

This hurried departure for the front was undoubtedly conducted extremely well. In two days pilots, mechanics and aircraft had all been collected and integrated into the unit. The urgency was so great that it was found necessary to purchase machine tools from private sources and to install them in the workshop lorries.

The battle for Antwerp did not go as had been hoped and the city was evacuated during the evening of October 8th. On the morning of that day No. 6 Squadron made its first operational sorties—one by Capt. A. C. E. Marsh with Lt. L. G. Hawker as observer, and the other by Capt. F. J. L. Cogan with Lt. C. Y. McDonald in the front seat.

Its immediate objective having failed, Sir Henry Rawlinson's force came under the command of Sir John French, and during the First Battle of Ypres No. 6 did tactical work for the 4th Corps, but was under G.O.C. R.F.C. for strategical reconnaissance.

The critical period of this hard-fought battle continued from October 19th to November 22nd, 1914, and during this time the squadron was stationed at Poperinghe. First casualties occurred on October 27th, when Lts. Rawson-Shaw and Mayne failed to return from a reconnaissance in the Lille area. After their take-off a westerly gale sprang up and the B.E. was unable to make sufficient headway to regain the British lines. The prevailing wind was, of course, westerly, so it always operated against our aircraft. It frequently reduced their ground speed to 20-25 m.p.h., and so there is little wonder that a reconnaissance 30 miles deep was then considered quite a feat.

Victory came for the first time to No. 6 on November 1st, 1914, when Capt. A. C. F. Marsh, while on a bombing raid, drove down and captured a German aircraft five miles north-west of St. Omer. This machine, a Fokker, was dismantled and brought to St. Omer airfield.

That No. 6 was destined to become a famous army co-operation unit adds significance to the fact that on November 20th one of its aircraft—with Lts. Adamson and Kinnear on board—observed for the first time for the guns of the 5th Division. A souvenir of this early act of co-operation is a photograph now in the possession of the School of Land/Air Warfare, and bearing the following inscription: "Facsimile of original first message dropped by a pilot of No. 6 Squadron, R.F.C., on October 20th, 1914, on 87th R.F.A., 12th Brigade, when battery was by the village of Ennetters near Lille. The German battery was on the outskirts of Lille." The actual message reads "You hit them. We must go home. No petrol."

It is thought that the Gunners' stripe, which has formed part

COMMANDING OFFICERS

Major J. W. H. Becke	31-1-14
Major G. S. Shepherd	6-3-15
Major R. P. Mills	9-12-15
Major A. S. Barratt	7-9-16
Major A. W. H. James	18-6-17
Major G. C. Pirie	9-7-18
S/L. W. Sowray	13-2-20
S/L. E. A. B. Rice	28-5-20
S/L. Manning	21-4-22
S/L. D. S. K. Crosbie	10-1-24
S/L. D. F. Stephenson, D.S.O., M.C.	13-11-25
S/L. C. N. Lowe	29-11-26
S/L. C. H. Keith	10-1-28
S/L. C. R. Cox, A.F.C.	21-2-30
S/L. J. P. Coleman, A.F.C.	1-3-31
S/L. H. M. Massey, D.S.O., M.C.	31-1-34
S/L. E. R. C. Hobson, D.F.C.	20-1-37
S/L. A. G. Adnams	18-4-38
S/L. N. C. Singer, D.S.O.	7-7-38
S/L. E. M. McEachaia, E.G.M.	8-1-40
S/L. R. E. Weld	10-10-40
S/L. P. Legge	23-6-41
W/C. E. C. Porteous	4-2-42
S/L. D. Weston-Burt, D.S.O.	1-1-43
W/C. A. E. Morrison Bell, D.F.C.	5-4-43
S/L. J. H. Brown, D.F.C.	20-5-44
S/L. R. H. Langdon Davies, D.F.C.	28-8-44
S/L. R. Slade-Betts, D.F.C.	4-11-44
F/L. Kendall	6-7-46
S/L. C. E. Mould	1-8-46
S/L. C. K. Gray, D.F.C.	5-12-46
S/L. D. Crowley-Milling, D.S.O., D.F.C. & Bar	4-11-47
S/L. P. A. Kennedy, D.S.O., D.F.C.	7-7-50

Capt. W. C. Adamson with his Bristol Scout. Note the Lewis gun, obliquely mounted to avoid the airscrew disc. Adamson was shot down by A.A. and killed near Hill 60.

Capt. A. S. Barratt, C.O. in 1916, standing by his B.E.

of the unit's squadron marking for many years, owes its inception to this reconnaissance.

By the end of 1914 No. 6 had become a fully developed army co-operation squadron working with the 2nd Corps. Duties included tactical reconnaissance, artillery observation with W/T, photography and trench mapping.

In the terrible gale which blew during the night of December 28th, in which the R.F.C. lost about half of its serviceable aircraft, No. 6 got off lightly with only one B.E. damaged. Several hangars, however, were wrecked.

Early in 1915 came a decision to provide each squadron with a wireless flight. To implement this decision A Flight of No. 9 Squadron (which squadron was originally the wireless flight of No. 4) under Capt. B. T. James, the W/T pioneer, was posted to No. 6. It replaced C Flight (Bleriots) which, with flights similarly displaced from Nos. 2 and 5 Squadrons, formed No. 16 Squadron.

The beginnings of interdiction as an aid to attacking troops could be seen in the attack by Capt. L. A. Strange (pre-1914 demonstration pilot and still, as Col. Louis Strange, D.S.O., O.B.E., M.C., D.F.C. and Bar, air-racing today) on Coutrai and Menin rail junctions behind the German front. This was on the first day of the battle of Neuve Chapelle in March, 1915. There were no computing bomb-sights in those days; Strange came down to 150ft before dropping his missiles over the side. It was in this battle, also, that the ground troops had, for the first time, air photographs of the area over which they had to fight.

By this time air interception had become sufficiently serious as to make some sort of defence necessary. On March 17th, 1915, two Martinsyde scouts were posted to No. 6 Squadron to chase away any enemy aircraft interfering with our patrols. Thus was the germ of Fighter Command born; from two aircraft per squadron came the fighting flights which developed until protection and offensive duties were taken over by specialized fighter squadrons.

A month after Neuve Chapelle the R.F.C. started to take an interest in the Zeppelin airship bases which the Germans were establishing in Belgium. With the object of gaining information as to the best means of destroying the sheds and their contents, Lt. L. G. Hawker started out alone on a B.E.2c. with two bombs to test the Controde airship-base defences.

Arriving over the shed at 6,000ft, he released one of his bombs. He then noticed above the shed a large captive balloon, in the basket of which was a machine-gunner; he demoralized this uncomfortably posted sentry by throwing hand grenades at him as he went by in a steep spiral to within 200ft of the shed before releasing his second bomb. Hawker's aircraft was hit 24 times but he succeeded in conxing it back to base. For this exploit he was awarded the D.S.O. and given command of a flight.

Although the prevailing west wind was all in the favour of German airmen their brothers-in-arms on the ground had to wait a long time before they had a north-east wind that would enable them safely to release poison gas (Ypres, April 22nd) for the first time. This dreadful business occurred within the squadron's patrol area and from aloft they watched a gap of some 5,000 yards driven into the Allied lines. The gap was eventually closed, mostly by the heroic efforts of the Canadian division of the 5th Corps.

Fighting between aircraft developed very quickly in 1915, to become an established part of air warfare. Offensive devices were many and peculiar. In May, Capt. Strange fixed up his Martinsyde with a weight dangling at the end of a 150-ft cable. The idea was to fly over an enemy aircraft and catch his airscrew with the wire. Twice he tried this device and each time succeeded in making the enemy pilot land, though he failed to break their airscrews.

On May 10th he was on patrol with his weight dangling and attacked an Otto biplane making for Menin. Strange headed it off with his Lewis gun, but while he was changing the drum the Martinsyde went out of control and into an inverted spin, throwing its pilot from the cockpit. Hanging on only by a centre-section strut and the gun mounting and with his feet caught in his safety-belt, Strange managed to kick his feet free, climb upwards back into the cockpit and regain control. Recording the incident, the squadron's chronicles make the laconic statement: "the squadron was fortunate in its personnel."

The summer and winter of 1915 saw a big increase in air fighting. The Germans had the new synchronized gun gear which enabled them to fire directly through the airscrew disc, sighting their guns by aiming the whole aircraft, whereas our pilots still had to use machine-guns on articulated mountings, detaching a hand from the controls to sight and fire. Though this equipment gave the enemy a great advantage the R.F.C. never lost the initiative.

No. 6 did its full share, and in doing so gained the third air Victoria Cross. Capt. L. G. Hawker, flying a Bristol Scout during an evening patrol on July 25th, attacked two enemy aircraft, one over Passchendale and another near Houthulst forest, both without decisive results. Climbing again to 11,000ft, he found another German over Hooge. In this attack he closed within 100yd before opening fire and as the enemy burst into flames it turned over on its back throwing the observer out. This encounter won the first V.C. given for air-to-air fighting and it is curious that the honour should fall to an officer of an army co-operation squadron.

No. 6 was also the first squadron to try landing intelligence agents behind the enemy lines. On September 13th, 1915, Capt. T. W. Mulcahy-Morgan set out in a B.E.2c. with an agent on board. Attempting a landing near Courtrai, he hit a tree and a wing was torn off. Mulcahy-Morgan and his passenger were injured but were able to dispose of their secret papers before being captured.

Capt. L. G. Hawker, who won both the V.C. and D.S.O. while serving with No. 6 in the early part of the First World War.

The officers of the squadron in August, 1918.

Back row: Lts. C. A. Lucy, G. E. Herring, E. A. Ealding, A. M. Anderson, J. T. Sorley, J. Owen, J. A. Howard, F. J. Russell, E. C. Clegg, M.C., F. C. Cook, C. D. Churchward, J. A. Holmes. Third row: Lts. E. F. V. Chard, R. Sterling, H. E. Fenwick, H. A. Record, W. T. Rees, H. A. Wuzerer, S. H. Scott, A. C. J. Payne, Capt. W. C. Shedal, Lts. H. E. Pettit, R. E. Towler, G. A. King, D.F.C., W. A. Clark, H. H. E. Holt. Second Row: Lts. A. E. Gay, T. Harris, Capt. H. Munden, D.F.C., Major G. C. Pirie, M.C., Capt. G. J. Scaramanga, Capt. G. D. Begg, M.C., Lts. O. C. Skinner, J. B. Mulvey. Front Row: Lts. D. A. McKerron, E. D. Dalmaine, F. W. Bate, G. Rowell, E. E. Wilby, E. L. Gibbenon, B. Martin, H. Douthwaite.

No. 6 SQUADRON, R.A.F.

Even as early as December, 1915, it had begun to be realized that bombing of important targets could be effective only if a considerable number of aircraft struck together. This led to formation flying and to the interdependence of aircraft in a formation, one upon the others, for protection.

The first of these "concentrated" raids, four days after Christmas, was against Comines railway station. Fourteen B.E.2cs made up the formation: four from No. 5, three from No. 6 and seven from No. 7 Squadron. One fighter aircraft from each squadron acted as escort. By the standards of those days the raid was successful. Hostile aircraft were seen but they did not venture to attack.

With the turn of the year the tempo of the fighting increased and frequently the squadron had to drop all normal duties to attend to a "General Artillery Action." This was an agreed signal whereby all action was concentrated on a particular area in which the Germans were suddenly attacking our lines or, perhaps, were putting in a counter attack. On one very busy day during a G.A.A., No. 6 engaged no fewer than 51 hostile batteries.

Despite the intensity of the fighting the unit did not at this time suffer many casualties. In the first half of 1916 only one B.E. was lost—shot down by a Fokker—and this in face of the fact that no specialized fighter squadron appeared in No. 6 squadron's area until No. 29 arrived in March with their D.H.2s. For its splendid work at this difficult time the squadron was mentioned in Sir Douglas Haig's first despatch. No. 2 Squadron was the only other unit to be accorded this honour.

The ferocious battle of the Somme, which opened on July, 1916, was not on the front patrolled by No. 6 but they did do a number of strategic bombing raids and kept up a continual pressure in their area to prevent the Germans from moving troops, guns or aircraft from the Ypres salient to reinforce those on the Somme.

It was during the Somme battles that No. 6 started night bombing. The first objective was again the railway station at Comines. Four of the squadron's B.E.s took part, each loaded with eight 20-lb bombs. The attack was made from 2,000ft, with good results. All the aircraft returned safely.

General H. M. Trenchard (now Marshal of the R.A.F. Lord Trenchard) was as much the advocate of independent air-force action in 1916 as he is now. In some of the raids ordered by him at that time the beginnings of air power as such can be discerned. In one such raid six aircraft from No. 6 joined forces with five of No. 5 and another five from No. 16 in an attack on Ledeghem railway station. Fighter escort was made up of five F.E.2ds of No. 20 Squadron and six D.H.2s belonging to No. 29. Thirty-one 112-lb bombs were dropped.

September, 1916, saw another change in command of the squadron, Maj. A. S. Barratt taking over from Maj. Mills, who had commanded for the past nine months. Maj. Barratt, who retired in 1947 as Air Chief Marshal Sir Arthur S. Barratt, has always been identified with army co-operation; he commanded the Advanced Air Striking Force in France in 1939.

Before Maj. Barratt left the squadron in the middle of 1917, their B.E.s had been replaced by the R.E.8s—a much-needed change. The new aircraft, which were the first to have tail-trimming gear, had a vee-twelve air-cooled 150 h.p. engine (designed by the Royal Aircraft Factory, a maximum speed of 102 m.p.h. and a service ceiling of 13,000ft.

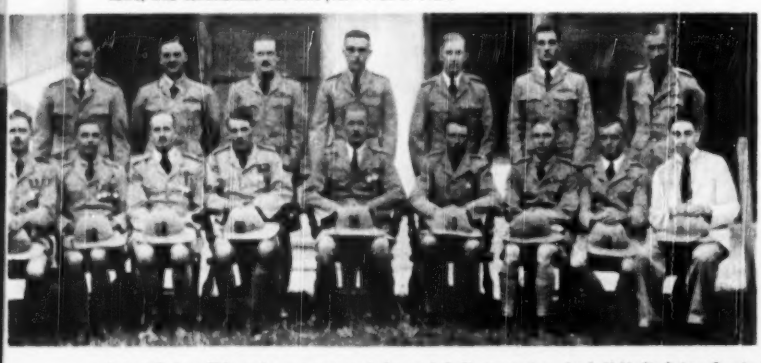
The first big job with the new equipment came in the preparation, on June 5th and 6th, for the battle of Messines Ridge—a position from which the Germans had overlooked our trenches for more than two years. In the two days of preparation No. 6 were responsible for 31 knock-out shoots, 24 gun-pits destroyed, a further 25 pits hit, 10 explosions caused and 38 successful trench and wire-cutting bombardments. In addition, 80 photographs were taken and 1,146 prints issued to the ground troops.

The battle proper opened on the 7th with the biggest bang of all time. Nineteen deep mines, containing nearly a million pounds of high explosive, were detonated under the German positions. For miles on either side of the sector our infantry were not allowed to be in their dug-outs in case of collapse when the explosion occurred.

The aircrews of No. 6 concentrated on contact patrol work, flying at 500ft-1,000ft and, although it was no part of their duties, they indulged in a little ground strafing as opportunity afforded. The battle was a success, but at a terrible price.

Just over a month later the squadron was involved in yet another major operation—the third battle of Ypres. In this connection it is interesting to read an account written by Capt. Wadham, who had only just joined the unit as a pilot. He wrote:—

Officers in tropical kit at Mosul in 1929. Back row: F/Os. Parkin, Bett, Fairhead, Rowe, Potter, Moore, Evans. Front row: F/O. Griffin, F/Lts. Carter, Russell, Howard, S/L. Kieth, F/Lt. Perry-keen, F/Os. Speight, Selk, Mr. Silver. The portrait on the right is that of S/L. C. N. Lowe, who commanded the unit from 1926 to 1928.



Bristol Fighter F2Bs and crews on parade for an A.O.C.'s inspection—by A. V-M. Sir Robert Brooke-Popham—in 1928.

"I remember the day fairly clearly as it was my first experience of an artillery observation squadron's role on a zero day. It rained most of the time and the clouds were at 300ft. Ypres itself was, I think, probably out of range except for guns, but the Huns were putting quite a lot of shells into Zillebeke lake—why, I never discovered, unless they liked the splash.

"The pilot of the first contact patrol machine was killed and the observer of the relieving one badly wounded in the leg. I was then sent up with an experienced observer called Quigley, a Canadian with an M.M. and M.C. and Bar. We had not been on the line for more than 10 minutes before a shell, it must have been an 18 pounder, drilled a perfectly neat hole through the peaked top of my R.E.8 cowling. I was extremely frightened but my observer appeared to think it was the best joke in the world and, as he kept me on the line for another two hours, I gradually came to see the affair from his point of view.

"That shell must have gone through the airscrew and over the top plane, for nothing was touched except the engine cowling."

Occasionally the R.E.8s got in the path of our own shells and by this cause Lts. Miles and Whittall were killed on the last day of August, 1917.

Squadron observers sometimes found themselves in the unenviable situation of being in an R.E.8 with a dead pilot. In the rear cockpit there was a jury joy-stick which could be fitted in a socket, but it gave only very limited movement. The rudder wires, where they passed through the compartment, had "thread reels" attached for use as grips. Control of the aircraft by this means was understandably sketchy.

A case in point occurred on September 25th, 1917. Lts. Worstenholm (pilot) and McCreary (observer) were on contact patrol over Cheluvelt when machine-gun fire from an attacking German aircraft killed Worstenholm and wounded McCreary in the hand. The R.E.8, which happened to be pointing towards our own lines, started to dive steeply. McCreary, who had never flown an aircraft before, pulled the nose up. As he did so he was again attacked and had to leave the controls while he fired over the tail to drive the German off once more. On regaining control he climbed to 6,000ft before realizing that he was not flying level. Having no throttle control in his own cockpit he then flew "downhill" until he was within about a mile of his airfield. History does not record how he proposed to throttle back, for at this point he lost control and stalled from about 300ft into an isolated patch of fir trees. Hearing of the crash from some Australian troops, Maj. James, who then commanded No. 6, went to the scene, picked up McCreary (whose fall had been to some extent broken by the trees) and took him to hospital. Maj. James records that on the way they stopped at 10th Corps H.Q., where McCreary gave a perfectly lucid reconnaissance report to General Cameron.

During September, 1917, the establishment of the squadron was stepped up to 24 aircraft in order to cope with the ever-increasing amount of work to be done. Throughout the whole of the third battle of Ypres each of the three flights had to maintain, weather permitting, two machines in the air from first to last light. In addition, the whole area of the 10th Corps, a 20-mile front four miles deep, was completely re-photographed twice a week—a formidable task with the equipment then available.

After the Ypres battle had died down—it had been a tremendous effort, defeated by rain and mud—the squadron, which had suffered heavy casualties, was moved down to Bertangles to be kept ready for the break-through, if it occurred, in the battle of Cambrai.

The break-through did not materialize and No. 6 was detailed for instructional duties. Unwanted observers were posted away and establishment reduced to 18 aircraft. The unit was then allotted in turn to each army for a stated period, during which senior army officers—from major upwards—were taught the capabilities and limitations of aircraft in co-operation with ground forces.

These courses went on right through the winter of 1917-18, until the great German offensive opened in March. No. 6, having no observers, could not be put in the line but they were fully occupied in finding and preparing airfields for our retreating forces.

At the end of the German advance the squadron continued with instructional and special work, except for a detachment known as K Flight, which was posted to the Cavalry Corps.

On July 9th, 1918, Maj. G. C. Pirie (now Air Chief Marshal Sir George Pirie, K.B.E., C.B., M.C., D.F.C., LL.D.) took over command, and nine days later the remainder of the unit reunited with K Flight at Fienvillers, under the orders of the 12th (Corps) Wing of the 3rd Brigade, to specialize in co-operation with the cavalry for the coming offensive.

For the final push the squadron moved to Bovelles, and of this period S/L. Pirie wrote: "We were, as it were, a free-lance squadron and were to follow the cavalry wherever it went, establishing ourselves as near cavalry H.Q. as possible. Extra transport was provided to make the squadron completely mobile."

On August 8th, 1918, the final attack by the Allies opened as a prelude to three months' continuous fighting from one victory to another. During the first period in which the Cavalry Corps was in action—the five days from August 8th to 13th—No. 6 Squadron performed 87 cavalry contact patrols (at an average height of 100-200ft), three counter-attack patrols and 15 artillery observation patrols. In the same five days the squadron dropped between 400 and 500 situation reports, messages and maps. All this work involved 290 flying hours.

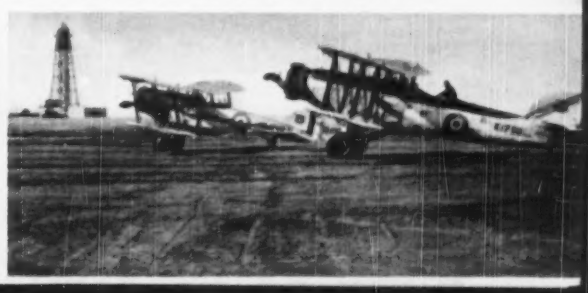
The intensive pressure was kept up to the end, and with fairly heavy losses. The last casualties sustained by the unit in the First World War occurred on November 5th, when 2nd Lts. Berry and Hamlet failed to return from patrol. These officers, however, were alive and well; they regained their unit on the 12th, the day after the armistice, having been well treated by the Germans, who had not bothered to send them to a P.O.W. camp.

After a period of communication and photographic work in France, which lasted until the spring in 1919, No. 6 was sent to the Middle East. It embarked on April 14th and 15th in S.S. *Malwa* and *Syria* for Basrah, where the squadron assembled on July 18th. Only the R.E.8s were taken, a few Bristol Fighters which had arrived in February being left behind. The R.E.8s (or "Harry Tates" as they were nicknamed) were re-erected

S/L. J. P. Coleman, A.F.C., the squadron's commanding officer in 1931.

B Flight under canvas at Bair in March, 1930. The tail of a Bristol Fighter can be seen on the left.

The change-over from Bristol Fighters to Fairey Gordons in 1932. The gunners' stripe can be seen on the fin of the Gordon.



No. 6 SQUADRON, R.A.F.

and flying five days after arrival at Basrah, despite the fact that five-fifths of the unit were in hospital with sandfly fever.

Now came the period of recession, during which most of the serving squadrons were either disbanded or reduced to cadre strength. It is No. 6 Squadron's proud boast that it is the only one of the original seven squadrons never to be disbanded or reduced to cadre.

Records for the next ten years of the squadron's history are not very detailed, but certain it is that strenuous and sometimes dangerous work was its lot for the whole period. In the course of the rebellion in Mesopotamia (now Iraq) in 1920, effective work was done by No. 6, which was the only R.A.F. unit in that area, with the exception of No. 30 Squadron, who had two flights away in Persia. When, in 1921, at a conference held in Cairo, it was decided to invest the R.A.F. with controlling powers—taking, for the first time, such authority away from the army, No. 6 was one of the eight squadrons delegated to the job. Sir John Salmond was in supreme command.

Turkey had recovered very quickly from the effects of losing the war, and was then becoming troublesome by pushing irregular outposts into the vilayets (provinces) of Mosul and Kurdistan. These outposts were attacked from the air wherever they appeared, but for a while affairs were critical and at one time a full-scale war betwen Britain and Turkey appeared imminent. The rebellion died down for a period, only to break out afresh and further air action had to be taken.

On September 24th, 1924, knowledge was gained that the Turks intended crossing the border and seizing Zakho that night. An offensive patrol of nine Bristol Fighters from No. 6 (officially designated "No. 6 Army Co-operation Squadron" since the previous March 27) arrived over the scene of operations in the morning of the 14th and, proceeding along the Hazil river, saw at 08.05 hr 300 cavalry crossing close to Biespon, 64 miles from Zakho. The crews withheld fire and reported back by W/T, the message reaching R.A.F. H.Q. in Baghdad, 300 miles away, by 08.12. Offensive measures were ordered and by 08.30 the Turks were in full retreat. One pilot was wounded but succeeded in reaching Zakho. The formation returned, refuelled and rearmed, and at 09.45 attacked another party of 150 horsemen at Birkar.

During this decade No. 6 also assisted in the almost continuous war with sheikhs Mahmud and Ahmad. Punitive flights against their followers went on from 1922 into the nineteen-thirties.

By 1930 the H.Q. of the squadron was at Ismailia, on the Suez Canal, and flights were sent to Palestine as required. The usual method was for the Bristol Fighters to proceed on the detachment and the ground crews to follow in Vickers Victoria troop-carriers.

In these days of turbojets, and when piston engines have long had self-starters, it seems strange to read of anyone being hurt while starting an aircraft; but No. 6 had an accident on the airfield in which L.A/C. Smith was killed and L.A/C. Luck injured whilst starting a Bristol Fighter. Hand-starting was then done by three aircraftmen holding hands, one man pulling the airscrew.

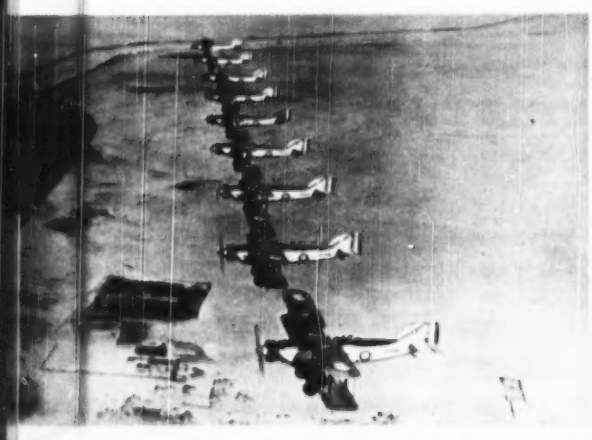
On April 1st, 1931, the role of the squadron was changed from army co-operation to bombing, and two months later, to the delight of the pilots, two dual-control Fairey Gordons (K1729 and K1730) were delivered—the first promise of anything but aircraft left over from the war.

Average flying time at this period was about 500 hours per month and included many patrols over the desert to find forced-landed aircraft, soldiers lost on manœuvres, R.A.S.C. lorries and civil airliners. On one occasion a three-hour search had to be made for Baron von Stohrer, the German ambassador, who was reported lost.

In April, 1933, a flight of Gordons, led by F/L. F. R. D. Swain (world's height-record holder in 1935) and including Group Capt. C. W. H. Pulford, started a journey from Cairo to Rhodesia and back. While on this detachment Swain was unlucky enough to crash his Gordon, but neither he nor his passenger, F/O. D. J. Alvey, was badly hurt. By the time the flight arrived back at Heliopolis they had completed 975 flying hours during the cruise.

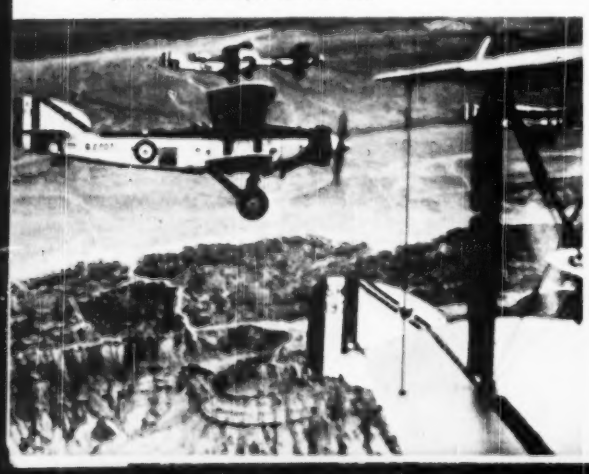
The ordinary work of the squadron was bomber training, but when trouble between the Arabs and Jews appeared likely —which was fairly frequent—there were a number of patrols to be flown. They included the inspection of the roof markings of all Jewish colonies.

January 31st, 1935, was the squadron's 21st birthday, but the coming-of-age celebrations had to be postponed owing to the unit's commitments for the R.A.F. Middle East Display held at Heliopolis on February 1st. No. 6 performed wing drill with Nos. 14, 45 and 55 Squadrons. A week later the



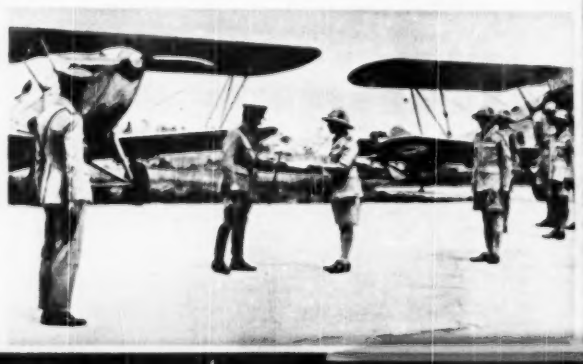
A pretty straight line : No. 6 Squadron's Gordons flying in line abreast.

For the King George V jubilee celebrations : A squadron formation of Gordons on its way to Cairo in 1935.



From air-cooled to liquid-cooled : Hawker Harts replaced the Fairey Gordons in 1935.

S/L. N. C. Singer, D.S.O., receiving the official squadron badge from the G.O.C., Lt. Gen. Haining, C.B., D.S.O., at Ramleh, April 26th, 1938.



birthday festivities were held. The day was declared a holiday after a short parade in the morning, during which a short history of the squadron was read. Celebration dinners were held in all messes and the day finished with an anniversary ball for all ranks.

In September of the same year came another change of mount—this time to Hawker Harts, with an additional flight (D) having Demons. Six of the Gordons went to No. 14 Squadron and the remaining six to No. 47. On arrival the new Harts were tested for endurance with full war load.

The first glimmerings of coming conflict were discernible in February, 1936, when a practice move was made to the squadron's war station in the Western desert. With the ground crews flying by bomber-transport the move took only 24 hours—an excellent performance. By this time No. 6 must have accumulated more "know how" on moving camp than had any other unit.

By the middle of 1936 the situation in Palestine had deteriorated very considerably. A striking force had to be kept at 45 minutes' readiness, but most stringent orders were issued to prevent precipitate action. Propaganda leaflets were dropped over villages, trains escorted and road convoys protected. Some actions were on a considerable scale. For instance, on June 21st a flight escorting a convoy on the Tulkarm-Nablus road observed Arabs attacking from both sides. In reply to emergency signals sent to H.Q., air action was taken which lasted until 19.00 hr. The squadron's aircraft were hit 13 times, forced landings following in three cases.

The utmost patience had to be shown, as was exemplified when, during September, a pilot of No. 6 answered an emergency call at Motza and located a group of Arabs. They promptly bolted into a nearby hut. Instead of attacking, the pilot informed the road patrol and kept the Arabs pinned in the hut until the arrival of troops to capture the whole gang. On this type of work, the C.O., S/L. Massey, was shot through the knee, P/O. Rampling was shot through the thigh and wrist, and another Hart was shot down, killing both occupants. For their service during this period S/L. Massey, F/L. Clark and P/O. Burns all were awarded the D.F.C. and Sgt. Dale the D.F.M.

The squadron badge and motto were registered in November, 1937, and in connection with this fact there is a tale to relate. Up to February, 1937, the badge consisted of a black falcon perched inside the loop of the numeral 6, with the motto "Oculi Exercitus." When this design was submitted to the Inspector of R.A.F. Badges for registration he stated in reply that, with few exceptions, numerals were not to be introduced into R.A.F. badges. A protest was promptly made, pointing out that No. 1 Squadron had been allowed to retain its numeral and also that the existing No. 6 badge had been in use since 1920 and was engraved on all the mess silver. A final reason given was that No. 6 was the oldest of the squadrons never to have been disbanded. The Inspector was adamant. It seemed that the badge would have to be remodelled completely—until a bright brain had the idea of adding a snake's head and tail to the figure 6. Honours were even between the squadron and Higher Authority. . . .

Troubles between Arabs and Jews flared up again at the end of 1937 and aircrews were again put at immediate readiness. The commanding officer, S/L. E. R. C. Hobson, D.F.C., was killed (he was awarded a posthumous D.S.O.) and S/L. Selway took over until S/L. Adams arrived on posting.

The shooting by the Arabs was very accurate and nearly every aircraft was hit by small-arms fire each time the squadron flew a patrol. On October 11th, 1938, two aircraft were lost from this cause: both were hit by rifle fire and F/L. Brown force-landed on a road and returned with his air gunner. The other crew baled out and, although the air gunner returned safely, the pilot, Sgt. Tarrant-Packer, was never heard of again.

On the last day of January, 1939, the squadron completed 25 years' continuous service. The silver jubilee celebrations were presided over by S/L. N. C. Singer, who had assumed command. This period of service earned for the squadron the award of the King's Standard.

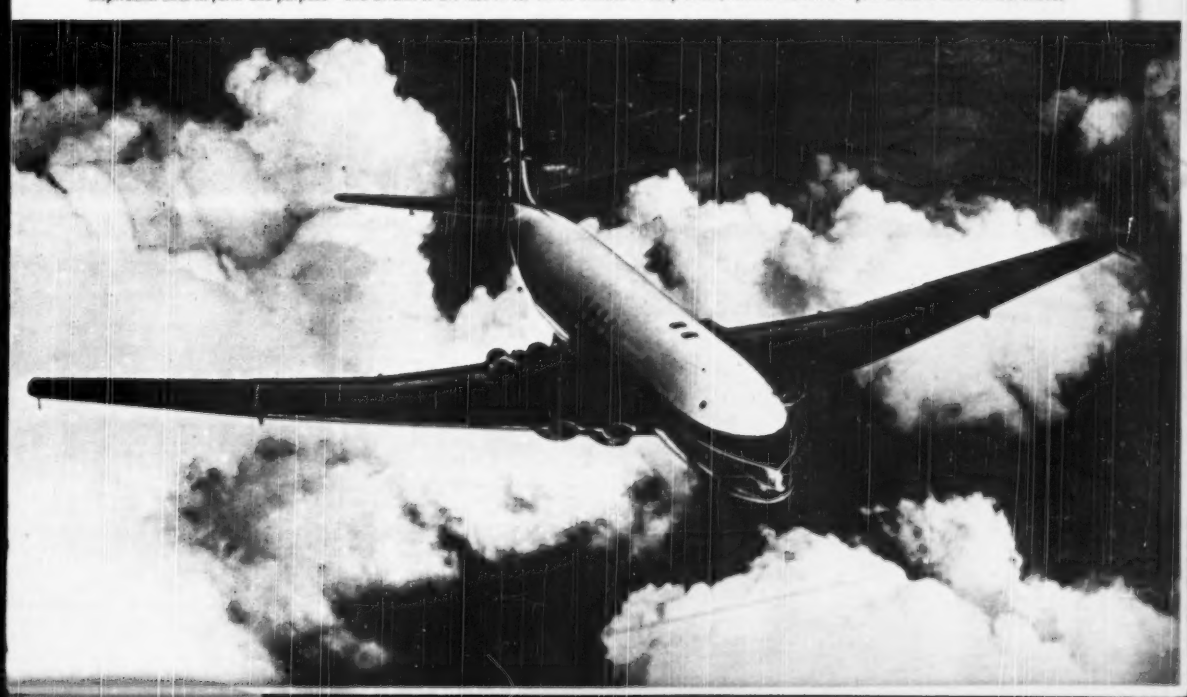
The disturbed conditions in Palestine continued throughout 1939. That life was truly strenuous at times is exemplified by an action which took place in May. P/O. McFall, flying from Haifa, located a large armed band and a continuous series of sorties against them took place, in which Sgt. Jarvis joined forces. A/C.1 Conway, an air gunner, flew alternately with these two pilots, spending 6 hr 45 min over the area and firing over 900 rounds of Lewis-gun ammunition. Both aircraft were hit and Sgt. Coggins in another aircraft, who flew Col. Christie over the area, was seriously wounded. He collapsed after flying back and landing at Jisr el Mujamiyeh.

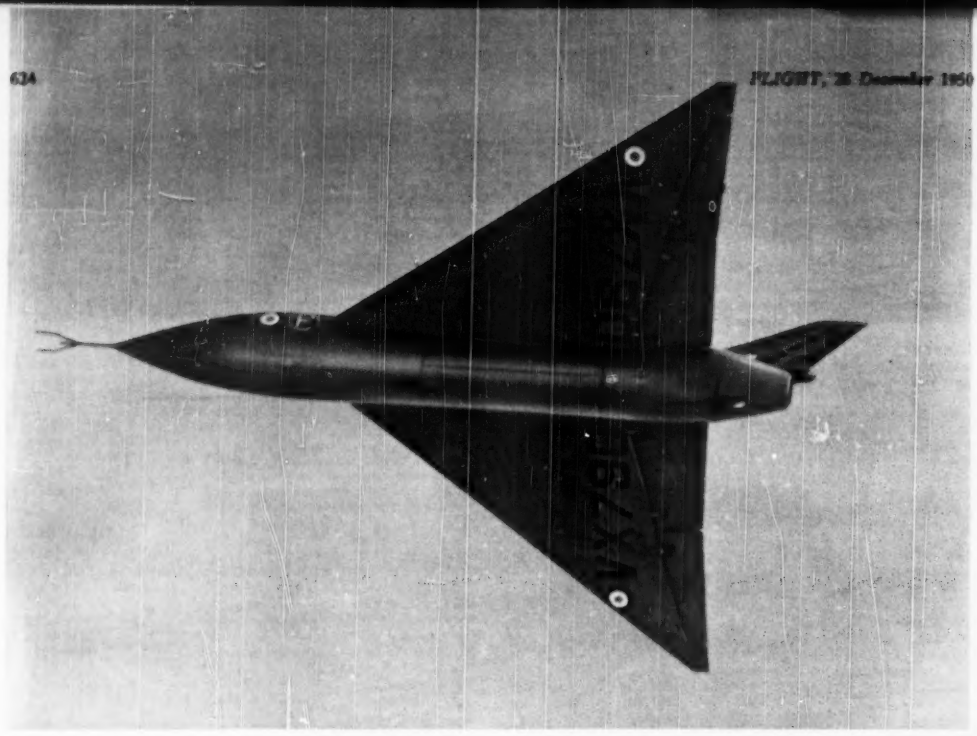
It is very doubtful whether any other unit of any of the Services has ever been awarded so many decorations for bravery during peace-time. For service in Palestine, up to the outbreak of war in 1939, members of No. 6 received three D.S.O.s, four D.F.C.s, nine D.F.M.s and two O.B.E.s, while a number were mentioned in despatches.

(*To be concluded*)

"MAKING ALL EARTH A FANE, ALL HEAVEN ITS DOME"—THE MATCHLESS COMET

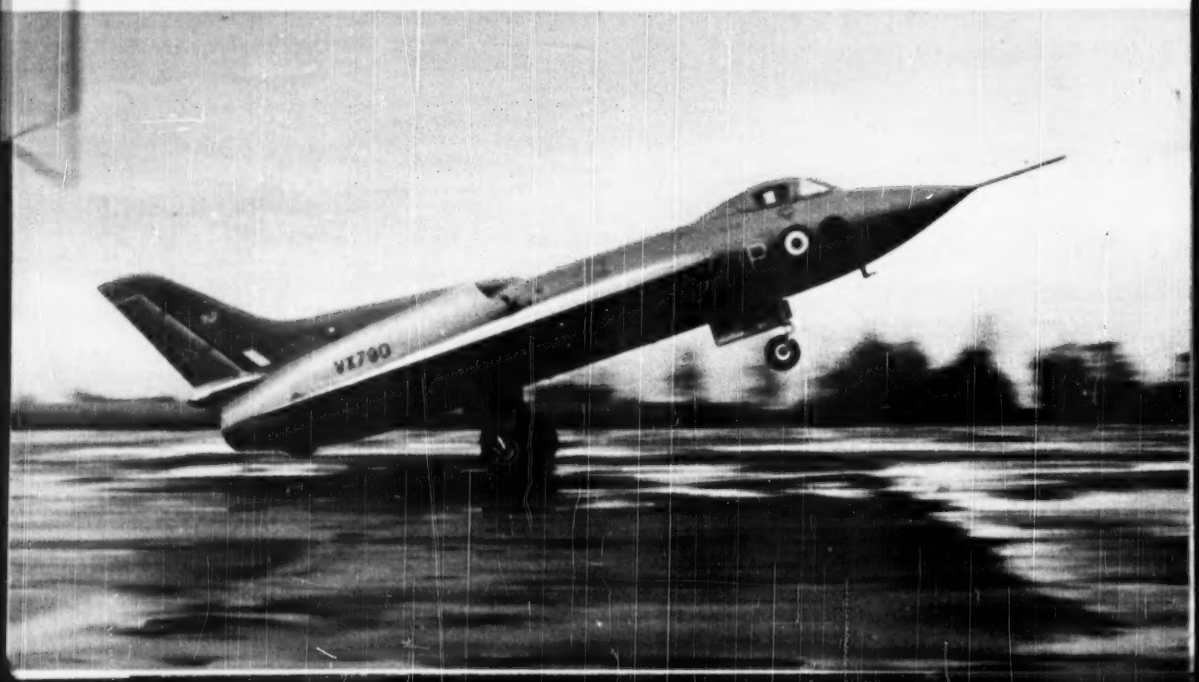
Tom Hood's words seem singularly applicable to the D.H. Comet—built to range fast and far in the pursuit of commerce and peace ; an inspiration both in form and purpose—and British to the last rivet. Three Comets already exist ; several others will join them in the months ahead.





GEOMETRICAL PROGRESSION—THE DELTA-WING AVRO 707B

PERHAPS better than any photograph yet published, that above reveals the character of the Avro 707B research aircraft. Since its first flight on September 6th this dainty and immensely valuable little machine has completed more than a hundred flights in some twenty-five flying hours. On the left, the 707B is about to touch down, with W/C. R. J. Falk, who has been the pilot on all occasions to date, using the anti-spin parachute as an air brake. Evident in the view below is the sharp angle of attack assumed at landing when the braking-cum-anti-spin parachute is not used.



The Westland-Sikorsky S.51 Helicopter fitted with the Alvis Leonides engine

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JOIN THE GREAT AIRLINES FLYING THE DOUGLAS DC-6

Linee Aeree Italiane (L.A.I.), newest airline to serve trans-Atlantic travelers, has chosen the giant DC-6 for operations between Rome and New York. And next year, passengers will fly the international routes of Swissair in unsurpassed comfort and speed aboard the new and still larger DC-6B.

This makes a total of 15 airlines which are operating the Douglas DC-6—all of them with dependable Pratt & Whitney engines and the majority with Hamilton Standard propellers.

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IT DEPENDS WHAT YOU MEAN

—by "An Act of Social Life" : Some Musings on Clausewitz, Uncle Joe and Air Strategy

By B. J. HURREN

ONE of the few really fascinating blobs of information which has (so far as I am aware) only recently seeped through the Iron Curtain, is that Stalin is a keen student of Clausewitz. It is fascinating because Lenin was just that too. Lenin, it seems, turned to Clausewitz to find military thought supporting, accidentally and independently, the theories of Marx.

This is good news; for what Stalin thinks, so does the Socialist Soviet. The student of Western Union air strategy, on the other hand, can no longer rely on the outmoded generalizations of Clausewitz, or even of Douhet, to secure him a pass in the subject.

Let us, therefore, examine some of the lilies of the mainly ragwort fields of General von Clausewitz's Kolossal Klump, in 8 Vols., entitled in English *On War*.

First, it should be appreciated that Clausewitz was a Pole, not a German as is popularly supposed. He was born in 1780; he fought, and was taken prisoner in, the Napoleonic Wars. He attracted the interest of General Scharnhorst after the defeat of the Prussian Army at Jena (1807).

He was wildly unpopular with the Jackboot Junkers clique, but despite this opposition from the crophead nobility he was appointed Director of the School of War in 1818. Although he was head man, the Junkers managed to debar him from actually giving lectures: those gems of the art of war which he gave as his testimony of shame were written. It must, therefore, be a fair assumption that some of his writings must have been as a sop to the Junkers.

Mostly, his compositions (of which the British Museum has only two full translations, one a direct effort in 1873 and the other a revised and annotated version of the same, in 1908) are plain horse-sense if considered as Olympic judgments on human affairs.

For example, he lines up with the cunning deepness of Frederick the Great, Machiavelli, Napoleon, Hitler and the much Dnieper ideas of Stalin, in asserting that the chief of an opposing army or state is *always* a lover of peace—he would like to enter a coveted State unopposed, and it is only the wretched people who do not submit to his wishes without fighting who want war.

Hence, with Mad Hatter logic, he comes to an assertion that war is an Act of Social Life—it is, as it were, no more than one of the many ways of expressing a conflict of ideas.

From this, the step to the idea that war is a Political Instrument is easy. But Clausewitz is careful to hedge, saying that it is not the *only* political instrument, and couples with this a clear indication that it is not for him to attempt—in such a work as his—to distinguish and differentiate between what is morally right and what wrong.

And so to the famous thesis, almost certain to melt the stone hearts of examiners: war is a continuation of policy by other, violent, means.

Now, the exposure of Stalin's interest in Clausewitz arises (we are told) from an earnest and admirably cautious citizen of the Soviet State who wrote to ask whether it was permitted to follow Lenin's fan-worship. Actually, Lenin had scored by hand various passages with which he agreed. But the point was that Clausewitz wrote about virtually hand-to-hand fighting and, shall we say, the era of pitch-poured-from-battlements. The idea of production on the modern scale, and the logistics of the machine age, were far beyond the conception of Clausewitz. The concept of air power was contemptuously ignored despite the clue from the early lighter-than-aeronauts.

So the Comrade who wrote to his Father on Earth had to be fairly careful, and he was lucky enough to gain an admission from Stalin that Clausewitz "greated" in his logic and grammar of war.

Clausewitz knew, and pondered deeply on, the terrible defeat of the French Army in 1812, when the Russians introduced defence in depth, not to mention scorched earth. And, fortunately, the Russians to-day appear to rely on this idea, in that they have moved at least 500 miles to the East the kernel of their war-production plant.

This defence of industry by depth, withdrawing from all reasonable air attack from bases in West Europe, is covered by having vast areas of Asia under Communist domination in China and Manchuria already, and with an obvious programme of expansion through South-East China to Indo-China, and through Tibet and Nepal to India.

Against this, those who advised on dispersing industry to the lower Siberian belt and Central Russia north of the dreadful Gobi and Sinkiang Deserts, may have overlooked the facts (a) that aircraft would increase immensely in range, and, with refuelling in flight, can fly round the globe without landing, and (b) that no place on the earth is more than 1,700 miles from open sea. (As a warning of things to come, long ago a B-36 carried 42 tons of bomb-load 1,500 miles.)

These two factors reduce to nonsense the idea of defence-in-depth against air attack, though the theory holds good for powder-and-ball Clausewitz. On the contrary, the very dispersal of Russia makes it so much the more vulnerable to long-range heavy bombers and really large flying-boats.

As to both these classes of aircraft, Major Seversky, riding his pet horse hard and straight, has had much to say. Drawing on the parallel of the battleship, which took on more and more armour, he advocates in his latest book a flying warship—a great bomber with the crew in a command-post in its heart: as, for example, a crew in a warship's gun turret. There is nothing in the final analysis (he quotes) between an aircraft which arises from water, from land, or from catapult, or whether its base is fixed or mobile. It is what it does after it is airborne that matters.

On this he underlines that if a V.2 weighing 14½ tons (of which one ton is explosive) can rise 100 miles into the air, a large aircraft firing a V.2s equivalent downwards would have a hitting power undreamed of in the last war. Here we have a missile against which, once it is released, no defence seems possible.

Cause—and Effect

It can only be a matter of time before Russia, finding herself ringed with an almost infinite number of bases from which aircraft with a range (from land, from carrier, or even submarine) of 1,700 miles radius of action, will resurrect the ancient slogans of Clausewitzian heroes.

Here is a quotation from an official report that came into the hands of the *Deuxième Bureau*:—

> The people must be accustomed to think that an offensive war on our part is a necessity. We must act with prudence in order to arouse no suspicion.

And an official commentary on this:—

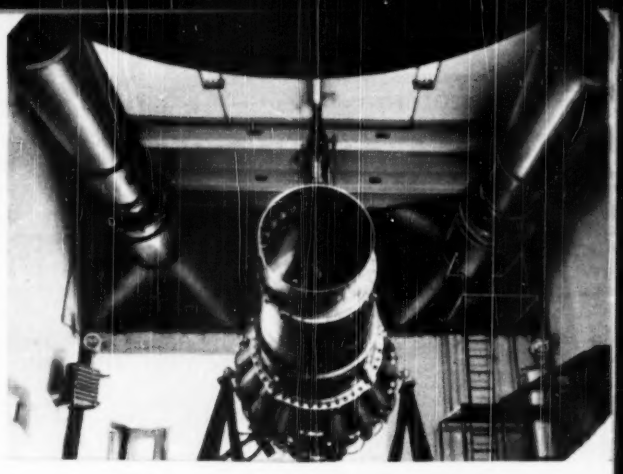
> The fable of the war of defence was helped out by the fable of encirclement. Situated in the midst of Europe, she had many neighbours, most of whom had more reason to fear her than to like her. Any exhibition of goodwill between these neighbours was treated by home statesmen, for years before the war, as a covert act of hostility, amply justifying reprisals . . . the peace of Europe hung by a thread.

These words are as up to date as though the period they relate to was 1913. They come, with minor editorial changes to preserve correct tenses, from *The War in the Air*, Vol. I, page 278). They were echoed almost verbatim by Hitler, and would make an excellent style-sheet for Russian propagandists.

The answer to such ideas is a persuasive weapon in the shape of an air fleet that will strike at the heart of the enemy from the first day of aggressive expansion, leap-frogging the unfortunate satellite states now in thrall under the crushing weight of the neighbouring Russian elephant.

ITALIAN TEST-HOUSE

Fiat Plant for Experimental and Development Tests of Turbojet Units



Air aspirated by the unit on test is measured by two venturi meters. The illustration shows a D.H. Goblin : Fiat is to build both Goblin and Ghost under licence.

LOCATED near Sangone, in the vicinity of Turin, a new turbojet test plant has recently been completed by the Fiat organization. It is intended for experimental and development testing and consequently the instrumentation is relatively more elaborate than that normally provided for routine tests. The test cell is isolated from the chamber housing the exhaust equipment and particular care is taken to seal doors, hatches and control-runs so that accurate measurement can be made of the air aspirated by the unit under test. For this purpose two venturi meters, mounted near the ceiling and receiving air from an antechamber, are provided. The inlet to the antechamber has an area of 20 sq m (215 sq ft) so that even if an intake at the rate of 3,330 cu m/min (117,600 cu ft/min) should be required the inlet velocity would only be 2.77 m/sec (9.0 ft/sec).

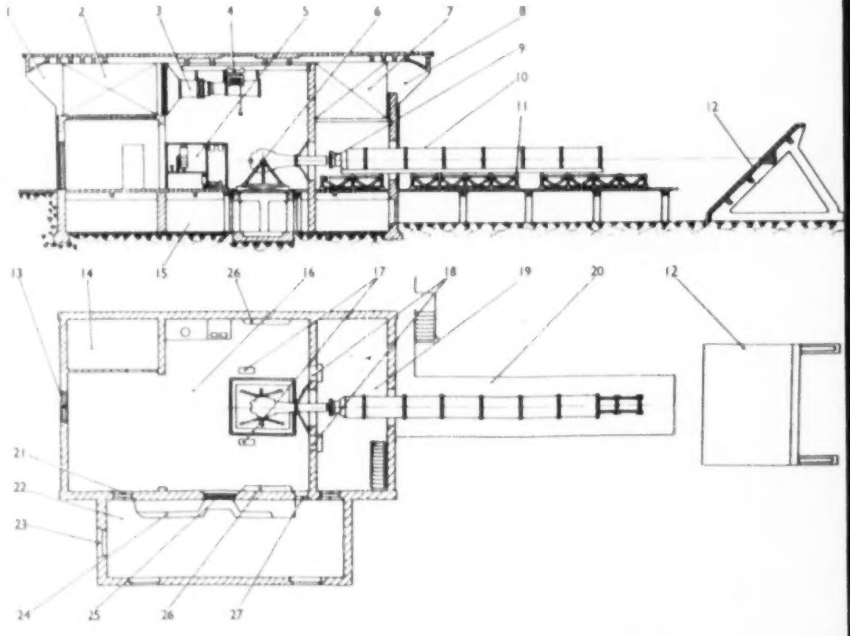
A similar but smaller inlet is arranged for the exhaust chamber which, being well ventilated, is also used to house resistances for the electrical equipment. Two fans mounted in the dividing wall enable the air in the test cell to be rapidly changed after a test has been run. The exhaust conduit, mounted on a roller track, is of the double-walled type and the front end is arranged to telescope for adjustment of the distance between the conduit and the turbojet nozzle. It is possible to retract the conduit and make a free-exhaust test of the unit. Axially aligned with the conduit is a concrete baffle inclined at an angle of 45 deg.

The test frame is equipped with a Hagan Thrustorq device indicating thrust up to a maximum of 4,000 kg (8,820 lb) on a panel in the control cabin. Fuel and oil, piped through the basement and hatches at each side of the test bed, are delivered by remotely sited pumps with connections arranged to permit the supply of either a straight fuel or a mixture.

In the control cabin, instruments for indicating or recording the more important measurements are duplicated—Smith double-scale tachometer, Faure-Herman electrical tachometer and high-sensitivity pressure gauge for the Thrustorq. Temperatures at various points of the unit under test are indicated by a battery of thirty-two pyrometers and five electric thermometers, while pressures are read on twenty-four gauges.

Under an agreement made public last week (as reported in this issue), the Fiat organization is to embark on the production under licence of de Havilland Goblin and Ghost.

(1) Air inlet to test cell
(2) Sound-proof wall
(3) Venturi tubes
(4) Lifting gear
(5) Frame for feed circuit
(6) Test bed
(7) Soundproof wall
(8) Inlet for exhaust cooling air
(9) Telescopic distance-piece
(10) Soundproof conduit for exhaust gasses
(11) Track for exhaust-gas conduit
(12) Baffle
(13) Main entrance to test cell
(14) Cabin for electrical apparatus
(15) Basement
(16) Test cell
(17) Access to feed connections
(18) Ventilation fans
(19) Cooling air chamber
(20) Support for gas conduit
(21) Door from control cabin to test cell
(22) Control cabin
(23) Control-cabin entrance
(24) Instrument control panel
(25) Observation window
(26) Armoured protection
(27) Supplementary observation window



Elevation and plan of the new Fiat test plant, showing arrangement of the principal features.

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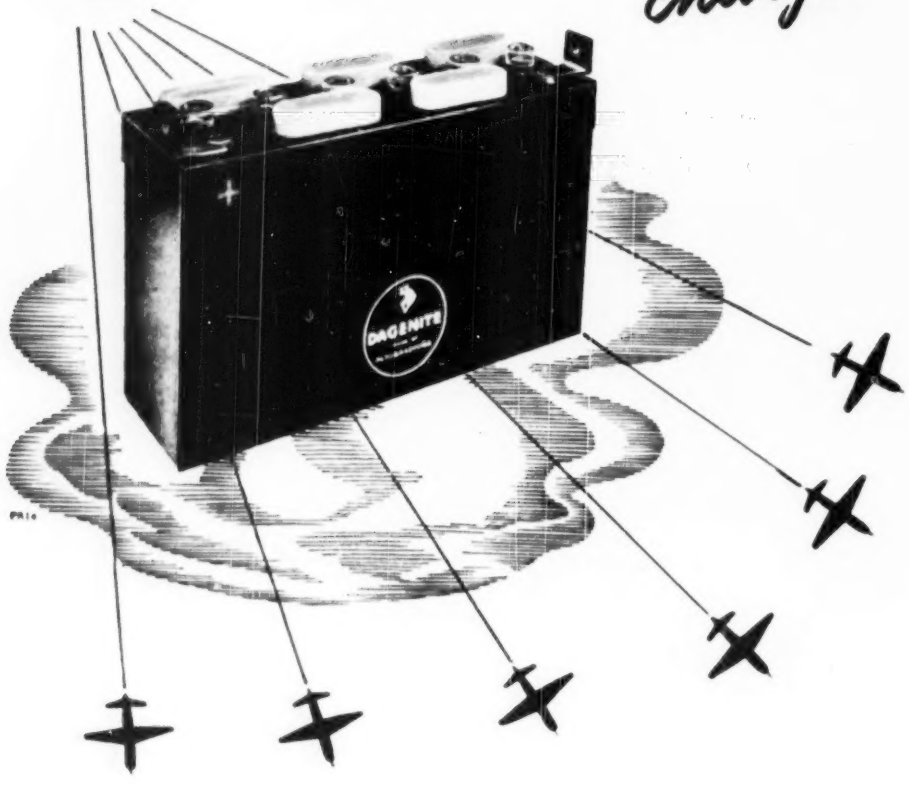
ON THE DE HAVILLAND COMET...

6 Successive starts on one battery charge



Although ground starting of the jet engines is the normal procedure, these batteries have been specially designed to start the Comet from inside the aircraft when required. On test recently a fully charged 24 volt set of batteries gave six successive starts without any charge during the intervening 5-minute rest periods. An exceptional performance for a 60 ampere-hour battery weighing only 52½ lb.

DAGENITE AIRCRAFT BATTERIES

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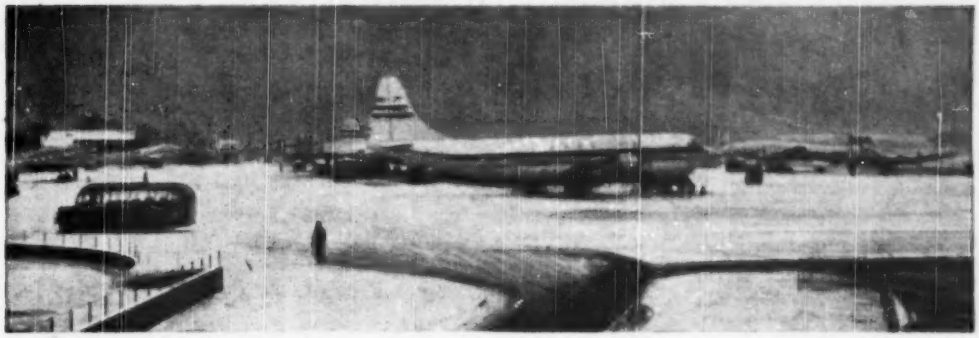
CIVIL AVIATION NEWS



WINTER CAMOUFLAGE: White-topped to reflect the heat of the sun, B.O.A.C. airliners also blend with their surroundings in the cold of a snow-covered London Airport. The Stratocruiser in the foreground is, of course, used on the Corporation's North Atlantic Services.

BRISTOL ACTIVITIES

IT is, perhaps, simply because the Brabazon is what it is, and because so much public interest is focused upon it, that the name Bristol has of late seemingly been associated with little else. But knowing something of the other activities engaging the attention of the company, *Flight* recently paid a visit to Filton to learn at first hand how things are shaping.

First, the Type 175. The mock-up of this aircraft presages that the real thing will be impressive; the lines are good, and the whole design looks right. Nevertheless, it should perhaps be stated at the outset that there is nothing glamorously "clever" about the 175 (it is early yet to be talking about detail design, for the aircraft is not due to go into B.O.A.C. service until winter, 1954-55) but everything we saw about the machine was reassuring. Summed up, it can be said to epitomize straightforward, orthodox design. Refinement exists in many aspects of the job, and the visitor quickly gains the impression that an unusual amount of careful appraisal and detailed forethought has gone into every element of the concept.

Since the early days of the 175 project, the requirements have continually been expanded and, as a result, the present aircraft, by comparison with the 1947 original, is virtually an entirely new design. The Centaurus engines originally projected have given way to Proteus turboprops, and the range and payload requirements have increased the physical size of the structure and, naturally enough, its gross weight. Briefly, the aircraft is a 140ft-span 130,000lb machine, capable, to quote representative figures, of carrying a payload of 23,500lb over a still-air range of 2,700 miles at a cruising speed of 330 m.p.h. at 25,500ft. Needless to say, the fuselage is pressurized and atmosphere-conditioned, the installation being designed to maintain a cabin equivalent of 6,000ft for all operating heights up to 35,000ft.

A variety of seating plans has been devised, whereby 50, 61 or 74 passengers can be accommodated in two saloons, with seats in rows of four (two + two), five (two + three), or six (three + three), at 41in pitch, the saloons being separated by the pantry, entry vestibule and wardrobe space. If these amenities are dispensed with, 83 passengers can be accommodated in a full-length saloon with seats in rows of six (three + three) at 41in pitch, and in all these pitch arrangements—which, of course, are inter-convertible—each row of seats is adjacent to a window. By reducing the pitch to 39in a maximum of 92 passengers can be accommodated.

A great deal of development work has been done on the 171 helicopter, and 15 of the latest version—the Mark 3—are being built, four of which have already flown. In addition, the new twin-rotor 173 helicopter, to which reference is made overleaf, is making excellent progress, and can be expected to have its first flight in about a couple of months. This new design should find a good deal of favour, for it has very much to commend it. The cabin is surprisingly spacious, and should easily seat ten people, whilst the employment of two individually driven synchronized and handed rotors should prove an effective safety assurance. The rotors, incidentally, are units identical with those used by the single-rotor 171s, and in this connection the 173 starts off with a bonus advantage by using a vital component which has already been thoroughly proven.

B.E.A.'s £¼ MILLION PROFIT

DURING the first seven months of the financial year 1950 B.E.A. showed a profit of £254,484, compared with a loss of £162,438 for the same period of 1949. Announcing these figures, Mr. Peter Masefield, chief executive, also stated that the capacity ton-miles recorded between April 1st and October 31st were 36,700,000 compared with 27,300,000 in 1949. Revenue increased by 34 per cent, and the profit during the period represented 4.3 per cent on turnover. Costs per capacity ton-mile flown had been reduced from 41.8d to 38.5d, and productivity per employee had gone up by 25 per cent. Also during the seven-month period reviewed, 692,536 passengers were carried, and it was hoped that by the end of the financial year the figure would have reached one million.

Between October, 1949, and October, 1950, B.E.A.'s deficit (i.e., moving annual total) was reduced to £946,700, and Mr. Masefield believed that before long the deficit would disappear. He forecast that for the year 1951-52 a revenue of £11 million would be attained; this was an increase of some 25 per cent over the previous year, and he believed that the Corporation would be able to achieve 20 per cent more revenue flying hours—an increase from 150,000 to 180,000.

Several new services are to be introduced next year, and of these the Malta to Cairo via Tripoli and Benghazi route, to be operated in conjunction with Air Malta and Malta Airways, Ltd. (B.E.A. have a 34 per cent share holding), will be opened during the first week of January. The new daily service between Northolt and Milan, which is to begin in mid-April of next year, is likely to prove a most profitable one. Until Elizabethans (Ambassadors) become available, Vikings will be used.

Substantial development of German internal services to be operated by B.E.A. with their Pionair (transformed-Dakota) fleet was also mentioned by Mr. Masefield, as were Dinard, Deauville and Le Touquet extension services with Pionairs, and Brest and La Baule services from Jersey with D.H.89 "Islanders."

PACIFIC WEATHER STATION

AT the end of last month the Canadian Minister of Transport, the Hon. Lionel Chevrier, attended a brief ceremony to despatch the first unit of Canada's contribution to the network of Pacific Ocean weather stations.

The establishment of what is known as Station P-Peter at latitude 50 deg N and longitude 145 deg W (about 900 miles due west of Victoria) is a part of the expanding programme of the Meteorological Division of the Canadian Department of Transport. Three ships are involved in the formation of this new station. Two, especially selected for their sturdiness, are the former naval frigates C.G.S. *St. Catherine* and *Stonetown*, and the third is H.M.C.S. *St. Stephen*, which has been operated in the Atlantic as a weather ship, but which will now be held available for emergency use on the new Pacific station. By international agreement, on assuming complete responsibility for the new Pacific station Canada relinquishes her share in maintaining a weather station in the North Atlantic.

Surface and upper-air information supplied by North Pacific Station P will greatly add to the accuracy of forecasts for aircraft and shipping in the North Pacific and will facilitate

CIVIL AVIATION NEWS . . .

weather-forecasting in Western Canada—in particular, by making possible more advanced prediction of gales and storms along the British Columbia coast. This is of special interest in view of the intention to introduce Comets on North Pacific routes in the not-too-distant future.

HELICOPTERS IN THE HOUSE

MR. Norman Dodds, Labour M.P. for Dartford, has given notice of two questions to be put to the Parliamentary Secretary to the Ministry of Civil Aviation. The first will be "Whether the inter-departmental committee set up to look into the potential use of the helicopter has yet made a report, or when this can be expected"; and the second: "If, in view of the many experiments that have been made into the use of the helicopter for inter-city travel, he will give consideration to the possibility of introducing a network of helicopter services operating between city centres in the near future; or what is holding up developments of this kind?"

It is probable that Mr. Dodds will be told that one reason for holding up developments of this kind is the absence of a suitable helicopter to do the work. B.E.A. is known to have investigated the possibilities of several such services in the British Isles in addition to the experimental one operated across Wales, but the Corporation is understood to be unwilling to consider operating into cities with a single-engined helicopter.

An impression of the Bristol 173 two-rotor helicopter.

A requirement is foreseen for a twin-engined, two-rotor design capable of carrying between 12 and 20 passengers, and in this connection the sketch of a new Bristol helicopter, reproduced here, is of particular interest. Similar in appearance to the machine illustrated, the prototype Bristol 173 is nearing completion and it is expected to fly early in the new year. It has two Alvis Leonides power units. Many months of test and development flying must, of course, ensue before this helicopter could be considered for passenger work. One source of information has quoted 1953 as the earliest possible date.

"DEUX PONTS" ON TRIAL

CHIEF pilots of several companies have recently been trying out the Breguet 76 Deux Ponts. They have included Capts. Genin and Lambert from T.A.I., Caze and Tuffal from Air France, Loubry and Combard from U.A.T., and others from Sabena and K.L.M.

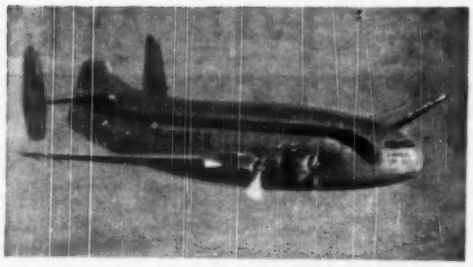
It will be remembered that the significance of the Breguet type numbers 76-1 and 76-3 is that the prototype had four 1,600 h.h.p. Gnome Rhone power units, while the 76-3 has four Pratt and Whitney R-2800-CA18s giving 2,400 h.h.p. each for take-off. The span of the aircraft is 140ft 10in, and the maximum weight 106,000lb.

C. OF A. FOR "FLYING CAR"

ALTHOUGH it is generally true to say that all dual-purpose devices suffer to some extent by comparison with those produced for a single intention, there is no reason to doubt the usefulness and unique abilities of some of them. Very many successful amphibious aircraft have been produced, and now comes a report that a "flying car" has reached the stage at which a Certificate of Airworthiness can be granted by the U.S. Aeronautics Administration. It was due to be issued on Dec. 21st. Known as the Fulton Airphibian, this ingenious vehicle was seen by many people in this country at the *Daily Express* Air Pageant at Gatwick three summers ago. A brief description of the machine appeared in *Flight* of August 5th, 1948.

Power is provided by a six-cylinder horizontally opposed air-cooled unit, and as an aircraft as well as in road form the machine has four small wheels in conventional road configuration, the front two steering in the normal manner. Accommodation is provided for two people side-by-side. As an aircraft, the vehicle has a cruising speed in the region of 110 m.p.h. and a landing speed of 48 m.p.h. On the ground, with wings, tail assembly and airscrew removed, it is suitable for cruising at speeds up to 50 m.p.h. Consumption is 20 m.p.g. on the ground and about 13 m.p.g. in the air.

The Fulton Airphibian is named after its inventor, Mr. Robert Fulton, who plans to put it into production immediately at Danbury, Conn. A target selling price is 6,000 dollars (£2,150).



"DEUX PONTS" PROGRESS: One of France's promising large transport aircraft, now well known by its name "Deux Ponts," has recently been sampled, as mentioned on this page by the chief pilots of several potential customers. In this new photograph the aircraft carries Air France markings.

ANGLO-FRENCH CONTROL AGREEMENT

REGULATIONS governing non-scheduled flights by British aircraft into or through France and French North Africa, and by French aircraft into or through the United Kingdom have, hitherto, been based upon informal provisional arrangements. From January 1st next such flights will be governed by provisions recently agreed between the governments of the two countries in an Exchange of Notes. Full details are contained in M.C.A. *Information Circular* No. 120/1950.

For flights to Metropolitan France and Algiers, application for permission can be made direct to the Secretariat, General a l'Aviation Civile et Commerciale, Direction de la Navigation et des Transports Aeriens, 93, Boulevard du Montparnasse, Paris; a minimum of 24 hours' notice must be given. For flights to French protectorates (Morocco and Tunisia), or to other parts of the French Union, applications must also be made direct either to the Residents-General of France at Rabat and Tunis, giving three days' notice, or to the heads of the territories, giving five days' notice.

In the case of military aircraft on delivery flights in the hands of civil crews, prior permission must be obtained through diplomatic channels, and applications should be made to the Ministry of Civil Aviation at Ariel House, London, W.C.1.

CONVAIRLINERS FOR ETHIOPIA

WHEN Ethiopian Airlines, Inc., complete their fifth year of operation in February next year they will have flown some five million miles. The figure on December 1st was 4,874,691 miles.

In 1951, several services which have hitherto been flown with DC-3s will be taken over by new Convairliners, which, apart from providing pressurized comfort in an area where heat and turbulence are often severe below 12,000ft, will reduce appreciably the time taken to travel from the capital, Addis Ababa, to cities in the surrounding countries.

When the Convairliners are put into service, take-off time for Cairo will be at the convenient hour of 10.30 a.m., but, because the journey-time will be reduced by three hours, arrival at Cairo will be the same hour as it is on the existing DC-3 service. To quote another example, flying time to Nairobi—at present 2hr 55min—will be halved.

ARGENTINA-GERMANY AGAIN—

FOR the first time since 1933 Argentina and Germany are again linked by air. Aerolineas Argentinas have opened a once-a-week passenger service from Buenos Aires to Frankfurt, via Rio, Natal, Dakar, Lisbon and Paris, using 48-seat DC-6s. One aircraft will be used to make each return trip, although a replacement will be held available at Amsterdam where, under an agreement with K.L.M., the operating machine will be overhauled before making the return flight. The first DC-6 to fly the route carried one passenger—Dr. G. Timmerman, commercial attaché at the Argentine Consulate in Frankfurt.

Aerolineas Argentinas have recently introduced new insignia, an illustration of which appears here.

The new badge now displayed on aircraft of Aerolineas Argentinas.

BREVITIES

THE first American experimental turboprop transport, the Convair Turboliner, is reported to be nearing the flight-testing stage; it is equipped with two 2,750 e.h.p. Allison T-38s.

* * *

A. V. Roe Canada, Ltd., has filed a patent for a "drain wick" to carry moisture outboard from the cabins of pressurized airliners.

* * *

It is rumoured in the United States industry that A. V. Roe (Canada) may fit American gas-turbine units in their second Jetliner, now under construction. Such a choice would, of course, have a strong appeal to U.S. operators.

* * *

As a result of an agreement between the Chilean State airline and S.A.S., a two-day service has now been made possible between Scandinavia and Santiago. A new run, linking Santiago with Montevideo and Buenos Aires, connects at the latter point with the S.A.S. services to South America.

* * *

As, under present legislation, the M.C.A. will not permit single-engined helicopters to cross the Channel with fare-paying passengers, it seems unlikely that authority will be obtained for the proposed London-Paris service to bring visitors to the Festival of Britain next year.

* * *

The C.A.A. is reported to be contemplating a revision of the transport category requirements for the Curtiss C-46. It is believed that substantial reductions in permissible gross weight are involved; if this is the case, the revision may possibly have a serious effect on many "irregular" American charter operators.

* * *

Production versions of the S.O.30C, the cargo version of the French Bretagne airliner, will be modified to incorporate wings of greater span than those of their passenger counterparts. Designed to give higher payload and shorter landing runs, the larger wing-span is being achieved by fitting extensions to the existing centre-section.

* * *

Having served as a member of the board of directors and as secretary-treasurer since the company was organized in 1932, Mrs. W. H. Beech has now been elected president and chief executive officer of Beech Aircraft Corporation. Mrs. Beech, who is also well known in America as a social worker, will fill the vacancy created by the death of her husband on November 29th.

* * *

Following an increase of 4½d per gallon in the price of aviation spirit in Australia, Butler Air Transport, the largest internal operator, has already announced a 7½ per cent increase in fares on all routes. Although the new prices will mean an increase of £163,000 a year in T.A.A.'s costs, this company has not, as yet, announced higher fares.

The French Foreign Ministry has granted permission for Pan American aircraft to land at Orly, and the company will now inaugurate a schedule between New York and Paris with an initial frequency of three flights weekly. The service will be extended to Rome as soon as permission is obtained from the Italian authorities. This will be the first time that Stratocruisers have operated to Paris on scheduled flights.

* * *

B.E.A.'s Edinburgh-London services, which had been suspended for three weeks for technical reasons, were resumed on Monday, December 18th. The M.C.A. has stated that alterations to the runways at Turnhouse Airport will not interfere with regular schedules. B.E.A. is also to inaugurate a new service between Renfrew, Manchester and Paris, and is considering the introduction of flights on other routes. In the coming year twelve new associate services, mostly from Prestwick, to Birmingham, Exeter, Isle of Man, Liverpool, Manchester and Blackpool, will be operated by Scottish companies.

PATIENTS' ENTRANCE: *Demonstrated at London Airport last week by Mr. D. Lowry—the versatility of the Christen Series IV Skyjeep, which has a hinged rear-fuselage decking to facilitate loading a stretcher or lengthy freight. The engine is a Cirrus Major III.*

BRITAIN'S AIRLINE OUTLOOK

(Concluded from p.614)

of the fact that the most intensive exploitation of the North Atlantic traffic potential—including the ability to fly direct—is vital to the advance of our air-transport industry. Clearly, therefore, the readying of aircraft suitable for this purpose is one of our most pressing problems.

And now to turn to the British independent charter operators, under whose envious gaze the year's crop of civil aircraft disported themselves at Farnborough—well out of reach of pocket to purchase and also, in most cases, of opportunity to operate. Under the British system of State-regulated competition on internal routes, the charter companies find themselves having to use mainly second-hand aircraft—usually those for which the corporations themselves have no further use. Many operators have doubtless shown an interest—though often a purely academic one—in aircraft such as the D.H. Heron, whose performance marks it as an ideal feeder-liner, but whose price (£35,000) places it beyond their reach. At 13,500 lb a.u.w. and assuming an annual utilization of 3,000 hr, direct operating cost is reckoned to be slightly over 20d per ton-mile for stages between 200 and 600 miles. This increases to 25-30d for a utilization of only 1,000 hr. The Percival Prince and the H.P. Marathon are similarly placed. It therefore seems that, for passenger services at least, the choice of the charter companies will be confined to modernized and possibly re-engined versions of types already in use.

It does seem regrettable that nearly all new British types other than those ear-marked for the corporations should be forced to seek their fortunes only in the overseas market. Nor does the present state of international affairs favour the placing of substantial orders by foreign airlines; and most of our sales for some time to come, therefore, will probably be of limited numbers of aircraft to small private companies.

Having acquired such desirable airliners as the Comet and the Viscount our Corporations stand to gain a considerable advantage from the extra traffic which they should be able to divert from foreign rivals using less competitive types; but it is also desirable that we should sell similar aircraft to non-competing operators in order to reduce our own initial costs. These types will have the added attraction of having been proved in service.

This, then, is the general outlook for British air-transport equipment for the next few years. However unsuited for our needs they may have been in the past, British airliners now coming into production are unquestionably among the world's finest. Given a reasonably equitable state of international relations in which to ply their trade it seems that our airlines may look forward, if not to speedy prosperity, at least to solvency within the foreseeable future. Given good fortune as well, Britain might even displace America from her present position in world airline operation.

E. A. G. R.

CLEAR-AIR GUSTS

A Digest of Dr. G. S. Hislop's Notable R.Ae.S. Lecture

ONLY since aircraft in increasing numbers have regularly been flying at the higher altitudes has clear-air turbulence become of note; but the ability of modern types to fly not only higher still, but faster as well, has steadily brought the matter into prominence. In the July 15th, 1948, issue of *Flight* appeared an article dealing with the pioneer work of the British European Airways Gust Research Unit. This formation, under the direction of Dr. G. S. Hislop, Ph.D., B.Sc., A.R.T.C., M.I.Mech.E., A.F.R.Ae.S., did valuable work, and in his paper, *Clear-Air Turbulence Over Europe*, given before the Royal Aeronautical Society on December 14th, Dr. Hislop reviewed the mode of operation of the B.E.A. Gust Research Unit, and thereafter gave an interpretation of the statistical results obtained.

The B.E.A. results had shown that, at around 25,000ft, *on average*, about eight miles had to be flown to meet a 4ft/sec gust; about 60 miles to meet an 8ft/sec gust; about 400 miles to meet 12ft/sec, and so on (Fig. 1). Most results had been obtained between 20,000ft and 30,000ft, and it was probable that, statistically speaking, the results were most reliable between those height limits. The apparent increase in distance to be flown for heights less than 20,000ft was possibly due to the smaller number of results available at 15,000ft. The increase in distance at altitudes above 30,000ft when gusts greater than 12ft/sec were considered, was also a reflection of the fewer results available. It was possible that the presence of the tropopause was a factor which made large gusts less frequent than at the lower altitudes; on the other hand, the number of small gusts increased at higher altitudes, i.e., the average distance to meet one diminished. This was probably a genuine effect, as the flight-crews frequently reported slight turbulence when passing through the tropopause. On the whole, and bearing in mind that a sample of 92,300 miles (the B.E.A. work) was relatively small, the variation with altitude could hardly be classed as of great significance.

In Fig. 2 is given a comparison between the B.E.A. and U.S. data, depicting the relative frequency of occurrence of gusts of various magnitudes irrespective of altitude. In this figure, the B.E.A. data have a threshold value of 4ft/sec, whereas the U.S. data have a much lower threshold value which, however, had been corrected to the British gust standards. It was extremely interesting to see how the B.E.A. curve not only lay between the two limiting curves but had the same slope at higher gust velocities. This confirmed that there was little difference between the frequencies of occurrence of gusts of moderate intensity at low and at high altitude in clear air. It also suggested that an extrapolation could be made on this diagram, with fair confidence, to velocities of about 36ft/sec.

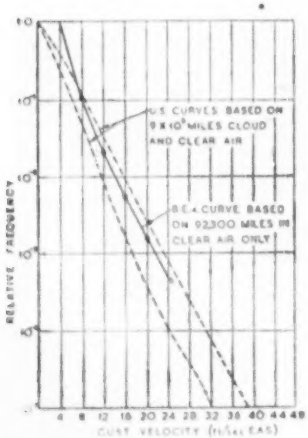

U.S. CURVES BASED ON 9 X 10⁵ MILES CLOUD AND CLEAR AIR
B.E.A. CURVE BASED ON 92,300 MILES IN CLEAR AIR ONLY
RELATIVE FREQUENCY
GUST VELOCITY (ft/sec E.A.S.)

Fig. 2 (left). Relative frequency of occurrence of gusts of various magnitudes.

Fig. 3 (right). Miles-to-fly to meet a gust of given (or greater) magnitude, plotted against gust.

In dealing with the question of extrapolation, Dr. Hislop considered it both justifiable and statistically more satisfactory to neglect the slight variation with altitude and to present all the B.E.A. data as a plot of miles-to-fly to meet a gust of given intensity versus gust velocity. This was done in Fig. 3,

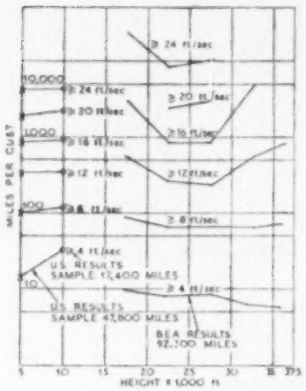
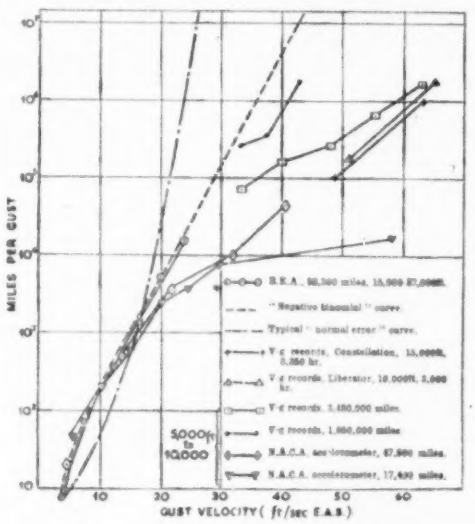


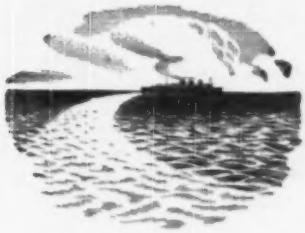
Fig. 1. Miles-to-fly to meet a gust of given (or greater) magnitude, plotted against altitude.

which also included some results of V-g recorder analyses conducted by the R.A.E. on Constellation and Liberator operations, together with samples derived from N.A.C.A. research.

It had been suggested that a law of the "negative binomial" type might fit the B.E.A. results, and it was clear from Fig. 3 that it did so very well. The negative binomial extrapolation might be a little optimistic, but the lecturer thought it a reasonable compromise to offer at this stage, at least for gust velocities up to about 36ft/sec. Some confirmation that the negative binomial distribution might be optimistic was suggested by the Comet encountering severe turbulence at high altitude during its early development trials (*Flight*, January 12th, 1950). The actual equivalent gust velocity at the c.g. of the Comet was not recorded in this instance, but it was probably around 35ft/sec. Even allowing for the probability that the mileage flown at the time of the occurrence (about 6,000 miles at above 15,000ft) had probably trebled since then, and no further turbulence of this order had been reported, yet the corresponding point lay between the negative binomial extrapolation and the V-g data. The broad conclusion was that the Comet episode could not be regarded as a freak.

To put the matter into perspective, it was of interest to consider what would be involved in operating a fleet of 20 aircraft, broadly of Comet type. At an annual utilization of 3,000 hours, the total distance flown in a year might be about 27 million miles. On the negative binomial extrapolation, a 36ft/sec gust would be met, therefore, on average, once a fortnight, and a 50ft/sec gust once in four years. These gust velocities corresponded approximately to acceleration increments of 1.5g and 2g respectively at the assumed cruising conditions. [A car stopping in 30ft from 30 m.p.h. experiences 1g.—Ed.]





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CLEAR-AIR GUSTS . . .

It was quite clear that many more data were needed to present a reliable picture to the aircraft designer and to the airline operator. The Comet episode underlined this need.

In considering meteorological aspects, Dr. Hislop observed that, if there was a large number of fully reported cases of clear turbulence, it might be possible to deduce the principal cause or causes by statistical methods alone. The other method of tackling the problem was to examine the immediate physical causes of atmospheric turbulence, and then attempt to obtain experimental confirmation by actual observation in turbulent regions (with a cross-check in non-turbulent regions). These physical causes then had to be related to the generating meteorological conditions, so providing a basis for forecasting.

Since turbulence involved the dissipation of energy, energy had to be supplied at a rate sufficient at least to counterbalance the dissipation. There were three main sources of turbulent energy: thermal instability, wave motion, and wind gradients. The possibility that thermal instability was a general cause could be disregarded, as in the great majority of cases a most noticeable feature was that the temperature lapse rate was markedly stable. Atmospheric waves were known to exist in association with mountains, but the wavelength of the resulting disturbance would merely result in a change in height of the aircraft, and not in the encountering of turbulent motion. Cold fronts had also been reported to give rise to atmospheric waves. There was a possibility that under certain conditions atmospheric waves might "break"—as a sea-wave does—and thus degenerate into turbulent motion, but there appeared to be no mathematical case covering such a breakdown.

The third source of energy was believed to be the most probable cause of clear-air turbulence. If, in the presence of a wind gradient in the vertical, no turbulence was present, then the purely viscous forces in the atmosphere were small. In practice, some turbulence would exist, and the eddies would diffuse in the vertical and horizontal, tending to break down the wind gradient. The eddies could be regarded, in fact, as a means of dissipating energy. The original theoretical approach linking turbulence with vertical wind gradient was developed by Richardson, who stated that, if the rate of supply of energy exceeded the rate of dissipation, existing turbulence would tend to increase.

Wind/Temperature Gradients

Realizing the importance of the local wind gradient in the vertical, the B.E.A. unit gave a great deal of thought to its accurate determination. Direct methods of attack, such as by use of a pitot trailed two or three hundred feet below the aircraft, or by laying vertical smoke trails and observing the relative shift, were considered in detail, but, whilst ultimately practical, had to be rejected as they required development beyond the resources of the unit.

An indirect approach was then proposed by Mr. D. M. Davies of B.E.A., who suggested that the relation between the vertical wind gradient and the horizontal temperature gradient, as expressed in the familiar thermal wind equation, might be tried. Hence, if observations of temperature taken at frequent intervals over a distance of at least 50 miles showed a marked temperature gradient, the presence of a marked vertical wind gradient would be deduced.

Dr. Hislop then referred to some flight researches made on this basis, in which some confirmation was given that, in the turbulent regions, it had been shown that the observed horizontal gradient of temperature implied the existence of a high vertical wind gradient, and also that the latter, when coupled with the observed temperature lapse rate, satisfied the Richardson criterion for turbulence within reasonable limits of experimental accuracy.

In one case, a radio-sonde ascent was available, corresponding closely in time and position to the turbulent area. The radio-sonde measurements showed a vertical wind gradient of only 4-5 knots/thousand feet. This, however, was not necessarily inconsistent, since the radio-sonde at 35,000ft would give a mean wind over a height range of 3,000-4,000ft. However, it did illustrate the inadequacy of radio-sonde data for an analysis of this sort.

A meteorological condition which, by definition, was bound to contain regions of high wind shear, was a jet-stream. This was generally taken as a narrow belt of high wind (100 knots or greater) embedded in an airstream of markedly lower velocity. The jet-stream was associated with high horizontal temperature gradients—frontal conditions in the upper air—which led to high wind gradients and, hence, to high winds when the gradients extended over an appreciable height range.

It might be expected that clear-air turbulence would be associated with jet-streams, and this was sometimes the case. Severe turbulence had twice been found in a jet-stream; on the other hand, on more than 20 other occasions the search aircraft flew across the course of, or near, a jet-stream without incident. On one occasion, the aircraft flew out from base in smooth air, and returned on a reciprocal course about 30 minutes later to find severe turbulence, despite crossing the jet-stream boundary both on the outward and return trips. A possible explanation was that, even in jet-streams, conditions became critical only in regions of limited extent.

The lecturer thought it unlikely that the effect of high ground would extend to high altitude except through some form of wave motion. During the B.E.A. gust research flights, two cases of turbulence had occurred near the Alps. The first was associated with a marked low-pressure region, and the second with a high horizontal temperature variation. The only other case where apparent wave motion had made itself evident was at 35,000ft over Cranfield, where there was no definite evidence relating it to high ground. It could thus be inferred that high ground was not an important source of turbulence except, perhaps, in a minority of cases.

An arrangement whereby details had been sent to B.E.A. of any clear-air turbulence encountered either by B.O.A.C. aircraft or by the de Havilland Aircraft Company's aircraft, had been in existence for some little time. So far, upwards of 30 cases had been reported, but these did not constitute a great deal of evidence, mainly because they were bare reports of what had been encountered without any attempt to gather specialized information. B.O.A.C.'s results showed a marked grouping at a position about 55 deg north 40 deg west, i.e., some hundreds of miles east of Newfoundland. Investigation into the meteorological conditions prevailing at the time of the incidents was still in progress.

Aircraft-design Implications

In the concluding part of his paper, Dr. Hislop observed that it was probable that eddies in the atmosphere might range in size from about 1ft to several hundreds of feet until they merged into the general large-scale movements of the atmosphere. Within this very wide band were those eddies or gusts which gave rise to "bumps" felt by aircraft, and such eddies probably had a linear dimension lying roughly in the range 50ft to 500ft. Eddies smaller than 50ft would be felt by a fast aircraft, not so much as a succession of bumps but more as an irregular vibration. On encountering eddies much larger than 500ft, the aircraft attitude would tend to adjust itself to the change in direction of airflow, that is to say, it would "ride" eddies of this size. These remarks applied, of course, to present sizes of aircraft, and the data given in the paper were generally applicable to aircraft of orthodox design at present envisaged.

Because they were met with little or no warning, clear-air gusts would tend to be associated with the normal cruising speed of the aircraft, irrespective of the magnitude of the gusts. On the other hand, the basic gust envelope of the British Civil Airworthiness Requirements associated the largest gust velocity with a speed less than the design cruising speed. Dr. Hislop suggested that the implications of this difference on the design requirements for high-flying aircraft should be examined.

There was the possibility that clear-air turbulence might be of a less irregular nature than that normally met, e.g., in cloud. The records showed here and there that for a period of a few seconds, the accelerations might occur at a sensibly constant frequency which might be as high as three per second at a speed of 350 m.p.h. Whilst this frequency was well below the wing fundamental vibration for aircraft such as the Mosquito, it nevertheless coincided with the natural frequency for an aircraft with a span of 130ft. The possibility of a series of eddies giving rise to accelerations at a frequency coinciding with the natural frequency of a large wing could not be overlooked. In such circumstances, the use of the normal alleviation factor which was based on the concept of a single up or down gust became misleading as the lag of the wing in responding to a given series of up and down impulses had to be taken into account. On some occasions, the effect of a given gust would be aggravated by the wing motion, and sometimes it would be reduced; but, emphasized the lecturer, in this light the orthodox "flat-topped" gust conception used for design purposes was clearly unrealistic.

Dr. Hislop ended his lecture by listing precepts which could be offered to operators and, especially, to aircrews:—

(a) Avoid flying in areas where jet-streams or high thermal gradients in the horizontal are known to exist.
(b) Avoid flying within 2,000ft of the tropopause.
(c) If heavy turbulence is encountered, assume that one is entering a jet-stream and (i) climb or descend until turbulence is reduced and/or (ii) fly at right angles to the local wind direction.
(d) Should it appear that wing oscillations are being excited by the turbulence, alter speed as much as possible, preferably in the increasing sense.

FROM ALL QUARTERS

Sabre versus Mig : More Continental-built British Equipment : Sir Guy Garrod on Preparedness : News from the Industry

THE SABRE BLOODED

TWICE within three days North American F-86 Sabre jet fighters of the U.S.A.F. have fought with Communist Mig-15s over Northern Korea, and on both occasions, according to General MacArthur's headquarters, have got the better of their opponents. In the first engagement one Mig was destroyed, and in the second, Lt. Col. Glen T. Eagleston, of Alhambra, California, scored hits on the port wing and port fuselage side of a similar machine—one of twelve encountered over the border town of Sinuiju.

It is presumed that the F-86s operating in Korea are of the "A" series, powered with a General Electric J-47 turbojet. This model is armed with six 0.5in guns, and is capable of 660-670 m.p.h. The loaded weight is believed to be well in excess of 16,000 lb, and the span is 37ft 1in.

U.S. Naval pilots, flying Grumman Panthers, have found that the Mig-15 is not only much faster than their own aircraft, but that it can turn in a shorter radius. According to Lt. Cdr. Malcolm W. Cagle, recently returned from a month's observation in Korea, the Panthers are, nevertheless, managing to beat the Migs by superior tactics and teamwork. This officer also avers that the Panther is a stronger aircraft than the Mig, though no evidence is adduced in support of this opinion.

ITALIAN VENOMS AND GHOSTS

PROGRESS during 1950 in tooling for the manufacture in Italy of the de Havilland Vampire has been "unexpectedly rapid," and an agreement has now been signed for the Italian production of the Venom fighter and Ghost turbojet. It is further announced that the Italian government has just placed a second order for Vampires, to follow those which have been flight-delivered from England during the past nine months. The imported Vampires are preparing the way for Italian-built machines of the same type, and for the later Venoms, in the creation of an Italian Air Force of modern jet fighters.

The agreement for the supply of Vampires and for the Italian manufacture of these aircraft and their Goblin turbojets was announced on November 29th, 1949. Manufacturing data for the Vampire were completed only in September, but already Italian-made jigs and tools are in readiness and will enable quantity production of the Vampire to start almost immediately. The merit of this achievement is the greater because the project was complicated by the need to transpose British dimensions into their metric equivalents.

Meanwhile, preparations for building the Ghost turbojet in Italy have gone ahead more swiftly than was expected, so that the time has come to complete details of the licence for the Venom airframe to take this larger unit. The arrangement brings together the resources of famous Italian concerns. The Fiat and Alfa Romeo companies are building the Ghost, whilst Fiat, Macchi and Ambrosini will build the Venom airframes, assembly of which will take place at the Fiat and Macchi works. Administration of the whole organization is being co-ordinated by the Sicmar company, especially formed to acquire the licences and materials.

The Italian air attaché, Lt. Col. D. Fanali, installs himself in the Vampire in which he led one of the delivery flights of these aircraft to Italy.

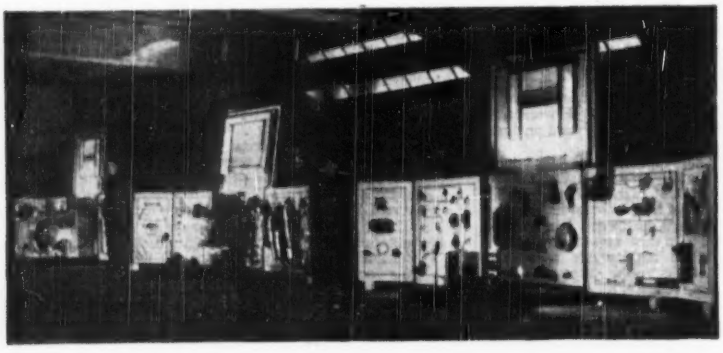
The degree of co-operation achieved not only in Italy, but with the British and French industries, is most gratifying. The Vampire is, of course, being built in France by the Société Nationale de Constructions Aéronautiques Sud-Est, at Marignane, near Marseilles, and the French have assisted the Italians in the conversion to metric dimensioning. British, French and Italian jigs are checked to a uniform standard under D.H. auspices and, notwithstanding the translation of measurements, complete interchangeability of major components is maintained between the three countries. Time has further been saved by the co-operation of the Swedish builders of de Havilland turbojets (Svenska Flygmotor) in providing metric data.

So quickly does the list of Vampire-equipped countries grow that brief recapitulation may be timely. The list as it now stands is: Great Britain, Australia, South Africa, India, Canada, New Zealand, Norway, Sweden, Switzerland, Egypt and Venezuela, as well as France and Italy. The Venom has been selected by certain of these countries and is likely to be taken up by others.

AIR LEAGUE'S WARNING

ANXIETY concerning various aspects of air defence, frequently expressed in this journal in recent months, was voiced once again by Air Chief Marshal Sir Guy Garrod, chairman of the Air League of the British Empire, at the annual general meeting of that organization on December 19th.

The British public, said Sir Guy, must be warned of the menace of the Russian Air Force. The Russians had some excellent designers, and they possessed the advantage of having been presented with 55 specimens of the Nene and Derwent.



IN A NUTSHELL : To acquaint servicing crews of Far East Air Force with the Dowty undercarriage hydraulic system, de Havilland Ghost turbojet and other components of the D.H. Vampire 5 fighter-bomber, these three mobile instructional units will shortly be flown to Singapore, accompanied by three senior-N.C.O. instructors. For ease of transport, the units fold into convenient packing-case form. Vampires are now being delivered by air to the Far East ; the arrival of the first six was reported in "Flight" of December 14th.

These facts, together with German assistance, might well have saved them several years of research and development, particularly on components. Since 1947 they had been flying a four-jet bomber, and while none was known to be in service it was evident that by this time, or very shortly, this aircraft could be in production. We had repeatedly been assured that research and development were continuing in this country on four types of heavy four-jet bombers, but we had been given no information as to progress, and it did not seem possible that any could be in production for, at any rate, a very considerable time.

For the next three years, at least, the Russians would have fighters of later design than any which the R.A.F. would have in service, and at least equal to those aircraft in speed and manœuvrability.

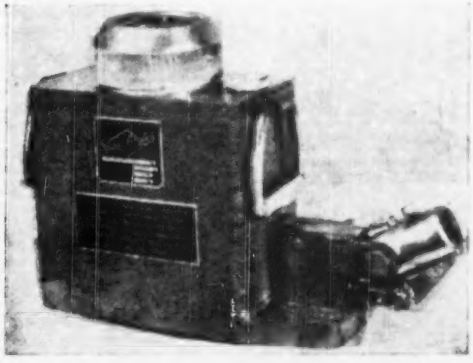
We could not feel happy, said Sir Guy, about the strength of Coastal Command. He was concerned at the paucity of the reserves of air transport which would be available to supplement the depleted Transport Command in an emergency. Practically the only such reserves were represented by the private charter companies, and the number of these, and of pilots and technical staff, had been dwindling during the past year at an alarming rate.

Sir Guy asked that the industries which would be concerned with air rearmament should be told as soon as possible exactly what would be expected of them. Air rearmament, he said, was not merely a matter of airframes and engines, but of vast quantities of ancillary equipment, the manufacture of which would make greater demands on certain raw materials and on man-power than the production of the aircraft themselves. The desperate shortage of raw materials overshadowed everything else. Could we, asked Sir Guy, be content that luxuries like television and wireless sets were being manufactured in large quantities when in this and Allied countries there was a famine, either existing or imminent, in many raw materials which were essential for the production of radar and wireless for aircraft and ground defence? He earnestly hoped that the country and industry would eventually be given a clear lead, and that everything would be done to create and maintain complete national unity in the face of the mortal peril that now confronted us.

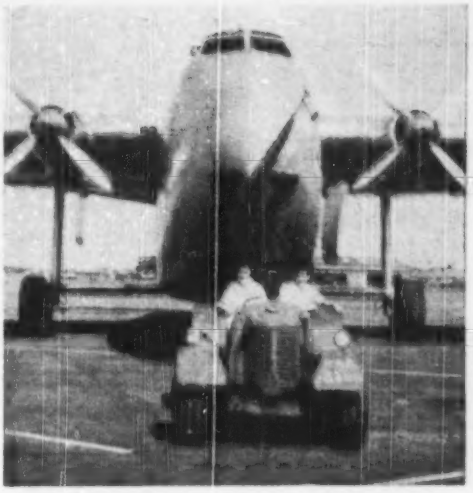
M. TONY ORTA

IT is with regret that *Flight* records the recent death of M. Tony Orta, honorary director-general (administration) and counsellor to Sabena. M. Orta, who was 62 years of age, was among the earliest pioneers of Belgian civil aviation, having qualified for his pilot's brevet in 1911, he served in the Belgian Air Force during the first World War. In 1920 he was appointed chief executive of S.N.E.T.A.—a company which, under the patronage of King Albert of Belgium, was the forerunner of the Belgian State airline.

It was largely due to M. Orta's efforts that the first Belgian colonial air link was established, in 1920, between Leopoldville and N'Gomba. When Sabena came into being, he was appointed controller of the company's African division; from 1942 until his retirement in 1949 he was chief administrator and director-general of the airline.



NOSE-LIFTER : Specially designed for use between twin nosewheels, this new Skyhi jack has a closed height of 11in. an 11in power lift, and can deal with loads of up to 38,000 lb. A smaller model has an 18,000 lb load capacity. Skyhi, Ltd., Warton Road, Isleworth, Middlesex, are the makers.



TRACTIVE EFFORT : With a drawbar pull of 7,500 lb—which may be increased if extra ballast is added—the new Type VIG-1C David Brown heavy tractor is believed to be capable of towing the heaviest aircraft yet envisaged. A six-position hitch gives maximum towing efficiency with any type of aircraft. After a Ministry of Supply contract has been fulfilled a limited number of the tractors will be available for airlines and constructors. One of the new type is here seen handling the Blackburn and General Aircraft G.A.I.60 freighter.

ALVIS APPLICATIONS

AT the 28th general meeting of Alvis, Ltd., Mr. J. J. Parks (chairman and managing director) recalled that five different aircraft were demonstrated at this year's S.B.A.C. Display with Alvis Leonides engines installed. In spite of the present world interest in gas turbines, so far there was ample evidence to show that a piston engine such as the Leonides would continue to be required for several types of aircraft. (The principal applications of the Leonides at the present time are in the Percival Prince twin feederliner and—adapted to run with its shaft vertical—in the Westland-Sikorsky 51 helicopter. The latest Prestwick Pioneer is also Alvis-powered.)

"WINGS OVER THE WORLD"

NOTWITHSTANDING two minor, but none the less painful, lapses in aircraft identification, and preliminary publicity which avers that "never before has civil aviation been brought to the screen in a manner so thrilling, pulsating and gripping," the film *Wings Over the World* should prove useful in selling commercial flying. The value of workaday scenes from London Airport and Northolt in indoctrinating cinemagoers is, to some extent, offset by an all-too-long sequence of "clowning" shots of a B.E.A. helicopter. This lapse is further compensated by some quite charming air-to-air impressions of the Comet and Viscount, calculated to bring home to the public something of the grace and majesty of these pre-eminent machines.

The film is a Harold Baim production. E. L. Baddeley, Frank Butters, Harry Stewart, J. L. Vosper and N. J. Bacon were technical advisers.

FORTHCOMING EVENTS

Dec.	29.	R.Ae.S. (Weybridge) : Annual Dance.
Jan.	6.	British Interplanetary Society : Symposium on the Orbital Rocket.
Jan.	9.	R.Ae.C. : Film Show, Londonderry House.
Jan.	10.	R.Ae.C. (Brough) : "Problems of High-speed Flight," by H. Davies, M.Sc., F.R.Ae.S.
Jan.	10.	R.Ae.S. (Weybridge) : "High-speed Flying," by S/L. J. D. Derry, D.F.C.
Jan.	16.	R.Ae.S. (Belfast) : "Landing Gear and Equipment," by H. G. Conway, M.A., F.R.Ae.S.
Jan.	17.	R.Ae.S. (Preston) : "Aircraft Materials," by Dr. H. Sutton, D.Sc., F.R.Ae.S.
Jan.	20.	Aircraft Recognition Society : Hurricane Trophy Competition.
Jan.	23.	R.Ae.C. : Talk on Korea, by William Courtenay, O.B.E., M.M.
Jan.	27.	Society of Licensed Aircraft Engineers : "Rocket Propulsion and Interplanetary Flight," by John Humphreys, B.Sc.(Eng.), A.M.I.Mech.E., A.F.R.Ae.S.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

An Historic Seaplane

I WAS very interested to read H. F. King's article on "Water-Based Fighters" in your issue of December 14th, and especially his reference to the Sopwith Schneider floatplane which won the 1914 Schneider Trophy Contest.

As a member of the small party of four who originally assembled the aircraft at Hamble, it is interesting to recall what actually happened. As Mr. King pointed out, the aircraft, as first built, had a single main float, and after Pixton had gone on board we launched the machine from the end of the slipway, holding the tail whilst the engine was started. After the let-go signal, and immediately the engine was opened out, the machine went straight over on its back, throwing Pixton (who had only just got out of bed after a very bad cold) into the icy waters of the Hamble river. The machine drifted out to mid-stream and after some time was made fast with a rope round its tail; finally it was pulled ashore on the change of tide at about 2 o'clock the next morning.

The considerably damaged wood and fabric structure was packed up and sent back to the Sopwith Works, where it was completely rebuilt in record time and, as Mr. King states, fitted with twin floats. It was then quickly despatched to Monaco where, in due course, it secured the coveted trophy for Great Britain.

R. E. NICOLL.

London, N.W.4.

The Coupled Proteus

THOUGH interested in your recent article (November 30th) in which you review "Development of the Turboprop," I would like to comment on your reference to the Coupled Proteus. You state, quite correctly, that both engine units drive the contra-gear box through a single common shaft, so that, in the event of a failure of one, the other drives both blade banks of the contra-prop. However, it is not true to say, at any rate in regard to the Coupled Proteus, that the inoperative turbine must be isolated mechanically by means of a clutch or freewheel.

The Proteus works on the free-turbine principle, so that the turbine driving the compressor is mechanically separate from the power turbine which drives the airscrew. It follows from this that, if one engine of a coupled unit were for some reason to fail (for example, due to failure of the fuel system) the engine could remain connected and the airscrew be driven by the remaining engine. The power absorbed by the engine which had failed would be small, because only the turbine wheel which normally drives the airscrew would continue to rotate.

The Coupled Proteus unit can, therefore, operate with any one engine of the pair shut down, without declutching the dead engine. Moreover, in the event of failure of one engine during take-off the aircraft is not subject to the drag of a windmilling airscrew as is the case with a "Siamese-twin" arrangement. With an airscrew in fine pitch this drag can be very considerable until the feathering mechanism is operated. The free-turbine engine has a great advantage over the conventional turboprop in this respect, because, with the latter in coupled form, the sudden failure of any one engine will cause the full airscrew torque to be applied to the remaining engine with the consequent severe risk of it stalling.

THE BRISTOL AEROPLANE CO., LTD.,
Richard N. Rowbotham,
Sales Manager, Engine Division.

Filton,
Bristol.

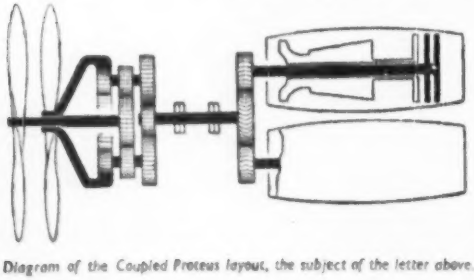
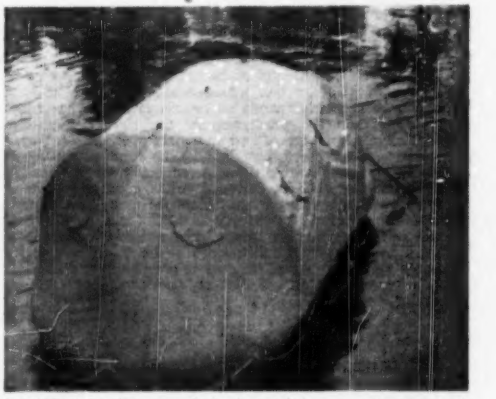


Diagram of the Coupled Proteus layout, the subject of the letter above.

Life-rafts—Round 3

IN the correspondence which has followed our letter concerning British and American life-rafts, Elliot Equipment, Ltd., have set out their own claims to an important design-contribution which they share with the Royal Naval Life Saving Committee. It is satisfying to feel that there is a wealth of design-skill amongst British rescue-equipment manufacturers. This undoubted fact should encourage us to make even better use of our skill in the development and manufacture of improved survival equipment in these dangerous times. Acrimonious discussion will profit us little—healthy competition will serve us well.



The 1939 inflated-canopy raft for Imperial Airways, referred to in the letter (below) from Mr. Robert Bicknell of the R.F.D. Company.

The American "stick-and-string manufacturers" referred to by Mr. Biles is an acid appellation to apply to Americans who have built plastic sun-stills, a tiny dinghy radio, and several other rescue aids unmatched by any British product. Indeed, the inflated-canopy raft shown in *Flight* of December 14th bears a remarkable likeness to a product of Goodyear of Akron, Ohio, dated, we believe, prior to 1945. The photograph herewith [reproduced above—Ed.] shows the R.F.D. inflated-canopy life-raft developed for Imperial Airways in 1939, nearly ten years ahead of the general introduction of such designs. The history of rescue-equipping development is built up around the most valuable contributions of each and every manufacturer in our specialist industry.

ROBERT BICKNELL,
R.F.D. Company, Ltd.

Godalming,
Surrey

Expensive Telephony

MAY I suggest that the current practice of companies on M.C.A.-operated airfields sharing an M.C.A.-controlled telephone system be subjected to review?

It is our misfortune to have occasion to call various people at Blackbushe with some frequency and, although we are usually unable to contact the required party or company, the call is chargeable to us as soon as the P.B.X. operator replies. This is, of course, contrary to the G.P.O. practice for private subscribers.

As the cost of telephone conversation is a major one in aviation, the above state of affairs must naturally add quite considerably to the overheads of everyone concerned; and, as with all costs, someone must foot the bill—the net result being an unnecessary charge added to the already high cost of a passenger seat.

We trust you will see fit to publish our plea in your columns, in the hope that our protest may be supported by fellow sufferers.

J. B. TREACY,
RepAircraft Services.

Broadbridge Heath, Sussex.

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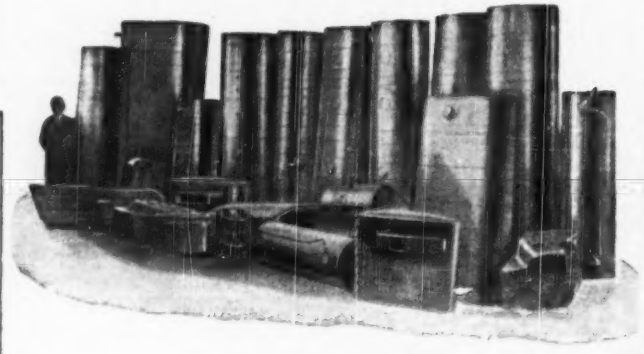

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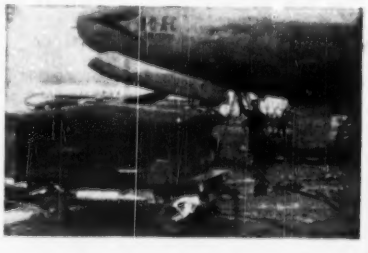

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SERVICE AVIATION

Royal Air Force and Naval Aviation News and Announcements

Airwork Enlisted

THE official inauguration of the first R.Aux.A.F. transport squadron—No. 622, recruited mainly from Airwork, Ltd.—took place on December 15th, when Mr. Aidan Crawley, the Under-Secretary of State for Air, handed over the log-books of the Squadron's first Valetta to the C.O., W/C. R. H. McIntosh. Those present at the ceremony included Air Marshal Sir Robert Foster, A.O.C.-in-C., Home Command; Air Marshal Sir Aubrey Ellwood, A.O.C.-in-C., Transport Command; Air Marshal Sir Robert Saundby (ret.); and Mr. M. D. N. Wyatt and Sir Archibald Hope, respectively managing director and commercial manager of Airwork, Ltd.

As reported in *Flight* last week, the new squadron will have an establishment of 57 officers and 107 airmen, most of whom will be recruited from the aircrews and ground staff of Airwork. It will form part of Home Command and will be administered by No. 62 (Southern) Group. The normal duties of the squadron's members are such that little extra training will be required, by comparison with other Auxiliary squadrons. Specialized military activity, e.g., supply-dropping, troop-dropping and glider-towing, will be practised in periods of annual training. For this purpose, the squadron is equipped with two Valettas—military versions of the Viking, as used by Airwork. The only other facilities provided by the R.A.F. are suitable messes near Blackbushe.

W/C. McIntosh, the C.O., is Airwork's chief pilot and instructor. In 31 years he has logged over 18,000 hours. He has flown with the R.A.F. in two wars (in the last war as a squadron commander with Coastal Command) and with a number of airlines. Although well known by his wartime rank, W/C. McIntosh will hold the R.Aux.A.F. rank of Squadron Leader.

At the inauguration ceremony, Mr. Wyatt promised that his company would do everything possible to ensure the success of the new formation's work. Employers joining the unit would, he said, be given the necessary time off to carry out the duties required of them. Mr. Wyatt emphasized that no financial advantage would accrue to Airwork by the formation of the squadron.

No. 622 Squadron's first Valetta: in the cockpit are Mr. Aidan Crawley (left) and W/C. McIntosh

(Left) At the 622 Squadron inauguration at Blackbushe, W/C. McIntosh (left) receives the Valetta's log-books from Mr. Crawley. In the centre are A. Cdre. Finlay Crerar, Inspector-General, R. Aux. A.F., and Air Marshal Sir Robert Foster. (Right) Sir Robert Foster and A. Cdre. Crerar are seen with Mr. M. D. N. Wyatt, managing director of Airwork, at the reception which followed.

R.A.F. Appointments

AIR COMMODORE J. MacC. KILPATRICK, O.B.E., M.B., B.Ch., D.P.H., will assume the acting rank of Air Vice-Marshal on taking up a new appointment, in January, as Principal Medical Officer, Middle East Air Force. Since last January, A. Cdre. Kilpatrick has been Deputy Director-General of Medical Services at the Air Ministry, and was formerly Director of Hygiene and Research from July, 1947. Born in 1902, he entered the R.A.F. in 1925. He was awarded the Arnott Memorial Gold Medal for 1931 for his devotion to duty while in charge of the Infectious Diseases Hospital at Halton during an outbreak

SERVICE AVIATION . . .

of cerebro-spinal meningitis there.

Another appointment taking effect next month is that of A. Cdre. P. S. Blockey, C.B.E., who becomes Director of Technical Plans at the Air Ministry. Since July, 1948, he has been Senior Technical Staff Officer at Transport Command H.Q., and was previously Station Commander at Cosford for nearly two years.

G/C. R. B. Lees, C.B., C.B.E., D.F.C., A.D.C., who has for the past two years been in charge of Operations at H.Q., Fighter Command, has been appointed to command the Metropolitan Sector, Fighter Command, with the acting rank of Air Commodore. Before going to Fighter Command H.Q., A. Cdre. Lees was Group Captain (Operations) at the Central Fighter Establishment for a year.

Passing-out Parades

WHEN the 51st General Duties and 2nd Equipment and Secretarial Entries graduated from Cranwell re ent'y, the reviewing officer was Marshal of the R.A.F. Viscount Portal of Hungerford. Lord Portal, who was the first C.O. of the Flying Training Wing at Cranwell in 1920, presented the Sword of Honour to the best all-round cadet of the 51st Entry, Flt. Cdt. U/Off. R. T. MacMullen, and the King's Medal to Flt. Cdt. U/Off. J. Price. The Medal of Honour for the 2nd Entry was presented to Flt. Cdt. U/Off. B. G. Cooper.

Addressing the cadets, Lord Portal said: "These are times of great anxiety and danger. No one can say whether we shall or shall not have to fight a third world war." He did not believe that any of the fighting services of any nation were held in higher esteem than the Royal Air Force, and added: "Whatever science may do in the future to substitute the so-called 'push-button' war for the methods of to-day, I am sure that for many years to come the strength and efficiency of our Service will be one of the greatest needs of the civilized world."

The Secretary of State for Air, Mr. Arthur Henderson, took the salute at another recent passing-out parade—that of the 58th Entry of Aircraft Apprentices at Halton. Mr. Henderson, in an address to the apprentices, spoke of the valuable training provided at Halton which, coupled with the new trade-structure, offered the fullest opportunities for rising to the top of the ladder. Halton, he said, had already made a wonderful contribution to the R.A.F.: over 5,000 ex-apprentices had gained commissions and some had attained Marshal's rank.

New Fireflies in Action

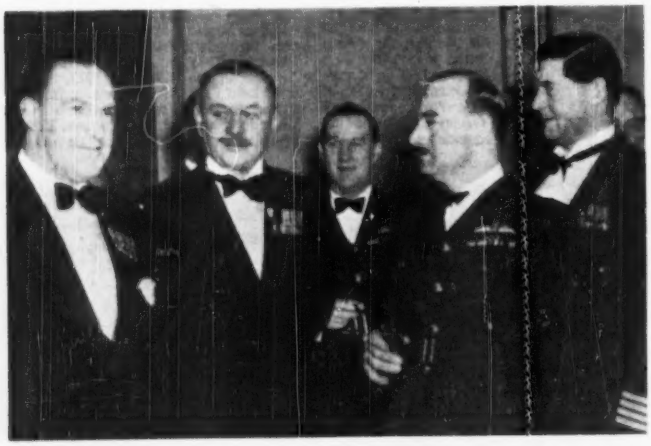
FAIREY FIREFLIES of the latest type—Mk. 6 anti-submarine aircraft—are now operating from H.M.S. *Theseus* off Korea. As no submarines have so far been encountered in Korean waters, however, the Firefly 6s are operating as dive-bombers and ground-attack aircraft, carrying bombs and rockets instead of the designed load of 12 sonobuoys.

616-Squadron Retirements

NO. 616 (South Yorks) Squadron of the R.Aux.A.F. recently held a dining-in night at Finningley to honour the retiring C.O., S/L. K. Holden, D.F.C., who has led the unit for the past four years. The new C.O. is S/L. L. H. Casson, D.F.C., who, like his predecessor, served with "616" in pre-war days. At the dinner, S/L. Casson presented a silver salver to S/L. Holden and engraved tankards to two other retiring officers—F/L. D. Gillam, D.S.O., D.F.C., A.F.C., the Flight Commander, and F/L. J. J. Lister, the Auxiliary Adjutant. Among those present were the Earl of Scarborough and G/C. C. C. O'Grady, Commanding Officer of R.A.F. Finningley.

R.A.F. New Married Quarters

SINCE the end of the war 3,380 new airmen's married quarters have been built at R.A.F. stations in the United Kingdom. Work is in progress on 1,698 others, many of which are nearing completion, and contracts have been let for the building of a further 490. The building of officers' married quarters is also progressing. In addition to 147 completed, 775 others are in course of construction, and there are contracts for 218 more.



SOUTH YORKS AUXILIARIES. Personalities at the No. 616 Squadron dinner reported above: in the foreground (left to right) are S/L. K. Holden; the Earl of Scarborough; S/L. L. H. Casson and G/C. C. C. O'Grady, C.O. of R.A.F. Station Finningley, the Squadron's base.

NAVAL PRECEDENT: Captain H. P. Sears, R.N., is believed to be, at 47, the first Naval officer of his rank to land a jet aircraft on an aircraft carrier. He was one of the five pilots who recently made a total of 200 landings with two production-model Vickers-Supermarine Attackers during intensive trials in H.M.S. "Illustrious." Captain Sears is the Commanding Officer of the Royal Naval Air Station at Ford, near Littlehampton.

In overseas commands 241 officers' married quarters and 685 airmen's married quarters have been completed since the end of the war. Additional married quarters for 27 officers and 12 airmen are under construction and the building of a further 187 for officers and 201 for airmen has been approved but has not yet begun.

R.O.C. Recruiting

A TOTAL of 2,198 observers, 459 of whom were women, were recruited as spare-time volunteers for the Royal Observer Corps in the six months ended November 1st. The Corps is now over 15,000 strong, but some 13,000 more observers are required. Age limits are from 16 to 55 (58, or exceptionally, 63, for ex-wartime observers). Volunteers serve a minimum of three years, undertake some three hours' training a month and attend exercises from time to time. Annual grants varying from £1 5s to £2 10s and a travelling allowance of 1½d per mile are payable for normal duty training, plus grants of 10s and £1 for passing the "Intermediate" and "Master" Tests. There are additional allowances from 2s to 5s for attendance at exercises and 5s a day for attendance at annual summer training camps. Uniform is free.

Reunions

A DATE has been settled for the second reunion of those who served in the R.F.C. or R.N.A.S. before the formation of the R.A.F. The reunion will be held on Friday, April 13th, at the Dorchester Hotel. Tickets will be 30s, inclusive of buffet and drinks. Further details of application will be announced next month.

* * *

No. 33 Squadron.—Informal reunion for all ex-members at the Tivoli Bar, Strand, London, on Saturday, January 20th, at 7 p.m.

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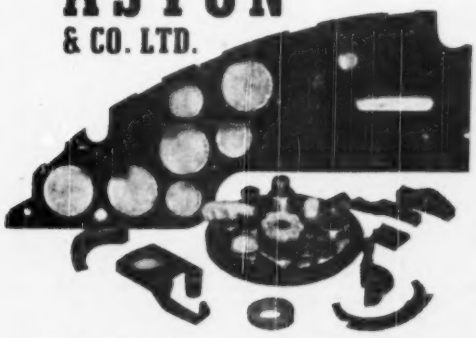

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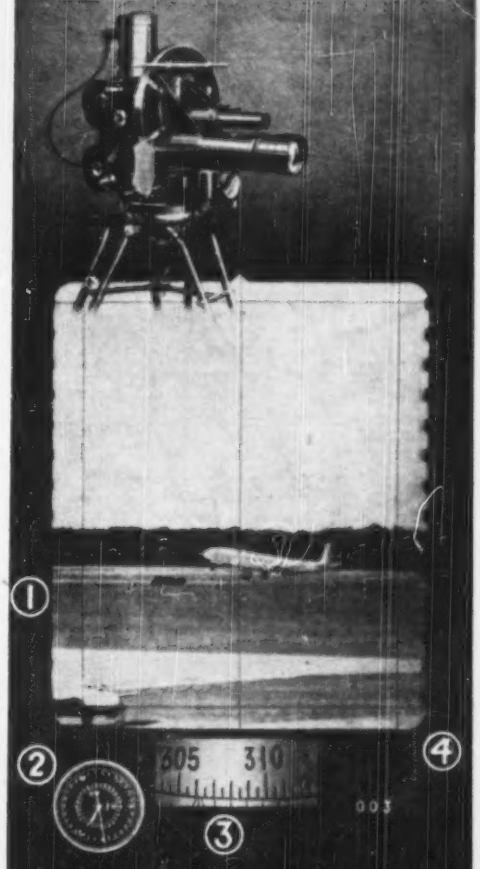

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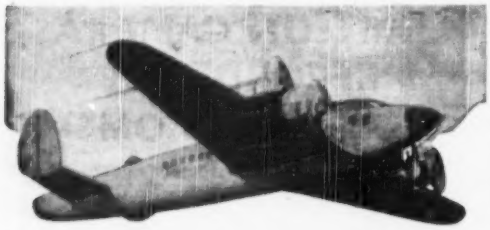

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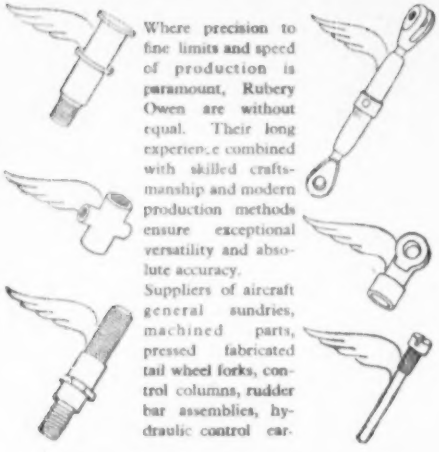

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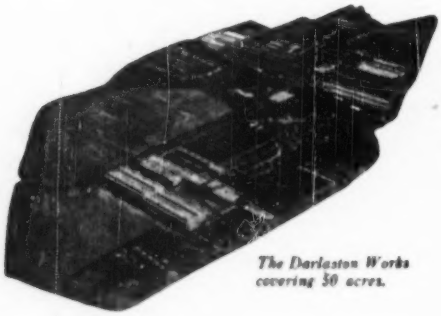

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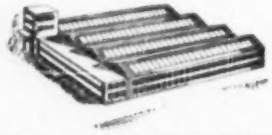

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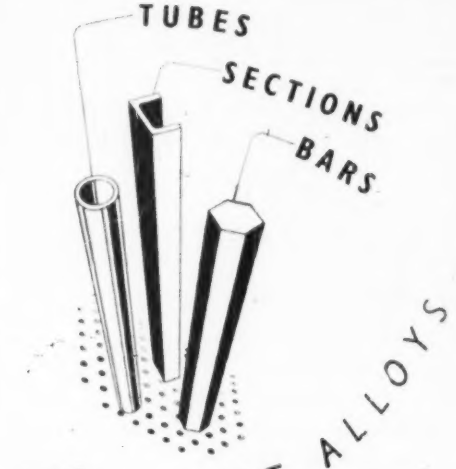

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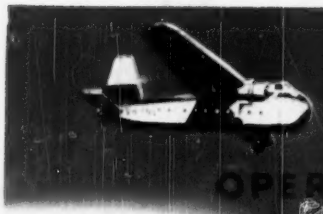

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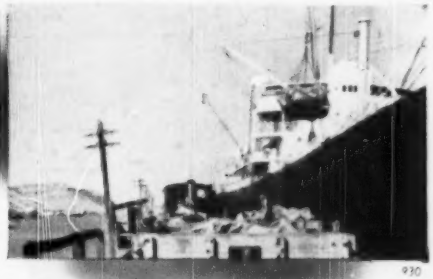

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